CONTENTS

CONTENTS

ELEMENTARY DOMESTIC SCIENCE

A TEXT BOOK FOR SCHOOLS

VOLUME I.

FOOD AND COOKERY

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A NOTE TO TEACHERS

This hand-book, while perhaps suitable for use in certain high schools, has been prepared chiefly to fit the needs of the upper elementary grades.

One of its aims being to correlate the subject of domestic science with the general course of study, some space is given to the history, cultivation, and commercial value of food products. Thus it connects with geography, agriculture or nature study, and history, besides allowing much opportunity for language work. In the practical problems of cooking, mathematics may be emphasized by having the pupils either lessen or increase the amount of materials stated in the recipes; also, by requiring them to compute the cost of the ingredients used in the various dishes. Such practice is not only of educational value in the class room, but may fit into the home life, in the buying and use of household supplies.

Although a text-book in domestic science must deal with certain phases of chemistry, physics and biology, this treatise omits, as far as possible, technical terms in such subjects, because pupils below the high school might not understand them. It is hoped that the explanations of natural phenomena may, nevertheless, be clear enough to give a general fundamental knowledge of domestic science.

In order to fit work in domestic science to the needs of various kinds of schools, this book is divided into three sections: I. Food, II. Cookery, III. Elementary Chemical and Physical Experiments with Food Materials. If a school has no equipment for either practical work in cooking or simple chemical experiments, the first section, giving information about food, may be used alone. In schools lacking a kitchen but supplied with chemical apparatus, it will be found possible to combine the work of the first and the third section. When a school is so fortunate as to have a kitchen laboratory the work of the second section

should be added to that of the other sections. In strictly industrial schools, emphasis may be given to the second section, certain parts of the first and third being taught through the second. It is hoped that the flexibility allowed by this arrangement may prove advantageous.

The author believes that the time is rapidly approaching —if not, indeed, already here—when people in general will realize that food should be studied mainly from the viewpoint of its effect upon the health. For many years, chemistry in its relations to food and cooking has held our closest attention. Of late, there have appeared books on physiological chemistry, or chemical physiology. These would seem to indicate that thought is turning in a somewhat different direction. In a broadly practical way, the influence of such thought appears in the experiments with training diets at various universities, in the investigations into army rations among the different nations, and in the active campaigns for pure food laws.

When the teachings of domestic science shall lead the general public to believe that "we *are* what we eat," and to select such food as tends toward the better health and the higher economic value of each individual, then will our subject have proved its right to rank among the great economic studies of the age.

SARAH WINDLE LANDES.

Stillwater, Okla.,
May 10, 1909.

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ELEMENTARY DOMESTIC SCIENCE

VOL. I.

FOOD AND COOKERY.

PART I.

FOOD.

Food is any subtsance that can be used in the body to form tissue, or to give heat. Some foods afford support in both of these ways, others in only one.

Adults need food for the single purpose of repairing the daily wear and tear of the system. Children require food not only for this reason, but also for the growth of new tissue. Thus, a child who builds up rapidly and takes much exercise is "always hungry." In early life, a lack of suitable food does more harm than in later years. An ill-fed child usually becomes sickly, or has a stunted growth.

If food is to nourish the body, it must, of course, contain materials like those of which the body is formed. Because many foods are similar to each other in substance or in their effect upon the system, they are studied in groups, called (1) carbohydrates (starches and sugars), (2) proteids, (3) fats, (4) mineral matter, (5) water.

CARBOHYDRATES.

Carbohydrates is a name given by chemists to starches and sugars. Nearly all of these are found in the vegetable kingdom. Their use to the human system is to give heat and energy. Should more of the starches and sugars be eaten than the body needs immediately, the surplus amount is stored up in the form of fat.

STARCH.

Starch is a fine white powder formed in many plants. It occurs in those parts from which the young plant starts. The starch is needed as food by the new plant until it puts forth roots and leaves of its own. Starch grains are not alike in all kinds of plants, but vary in size, shape and general appearance. For instance, the grains of potato starch are an odd, oyster-shell shape, and also quite large compared with the starch grains of rice and tapioca.

Cold water has no effect upon starch. As an example, when a cold starch mixed for starching clothes is allowed to stand, the starch gradually settles. If the water then be poured off, and the starch dried, it will regain its original form.

On the contrary, when a boiled starch is made for clothes, the starch grains absorb the water and swell, thus thickening the liquid. Should this mixture be allowed to stand, the starch will not separate out, the heat and moisture having changed it to a different form. In the cooking of starchy foods, a like action takes place; and it has been found that starch grains when thus mixed and swelled are much more easily digested than when eaten raw. (The swelling of starch by heat and moisture is curiously shown by the popping of corn, when the kernels increase so greatly in size that a pint before popping measures six or eight quarts after popping.)

Dry heat, if intense or long continued, has a stronger action than moist heat upon starch. For example, in baking bread, when the crust turns a deep yellow, the starch is changed to a more soluble form which has been given the name dextrin. This is even more easily digested than boiled starch. So, the crust of bread proves less of a tax upon the digestive organs than the crumb. For a like reason, toast, rather than fresh bread, is allowed to invalids.

Much harm may result from the habit, which some children have, of eating uncooked starchy foods, such as raw peanuts, chestnuts, or potatoes. Slack-baked bread and biscuit are likewise objectionable. Many of the "ready-to-eat" breakfast foods cause indigestion apparently for the reason that the starch has not been thoroughly cooked.

CLASSES OF STARCHY FOODS.

Among the starchy foods in common use are the cereals, potatoes, dried peas and beans. Starch occurs also in tapioca, sago, bananas, chocolate, peanuts and chestnuts; and, to a small extent, in certain other fruits and vegetables.

THE CEREALS.

These take their name from Ceres, who was worshipped in olden times as the goddess who took especial care of the growth of grains. They are really grasses, the seeds of which are used for food. By special cultivation through many centuries, they have developed a large amount of food material with only a small amount of husk.

In the United States, the cereals in greatest demand for food are wheat, corn, oats, rice, rye, barley and buckwheat. (The last, while not a true cereal, is usually classed as such.)

Among all vegetable products, the cereals are in many ways the most important. Not only do they yield much nutriment, but in a form especially easy for man to obtain. They grow in nearly all parts of the world, almost every nation having a special cereal in common use as food. Some thrive in moist soil, others in dry. Certain ones yield best where the climate is warm, and others where it is cold. Because of the dryness of all such grains, they can be kept for a long time without spoiling, many millions of bushels being stored each year in the great grain elevators of the West. They are also convenient for transportation. In this way grain has had much to do with the building up of the enormous shipping industries of the Great Lakes. Thus, not alone the food value of the cereals, but their commercial importance as well, is very great.

WHEAT.

Chemical Composition.

Carbohydrates 71.2, water 12., proteid 11., cellulose 2.2, mineral matter 1.9, fat 1.7.

Among all the cereals, wheat ranks as being the most nearly a perfect food. Its chief defect is its small amount of fat. So the common habit of eating butter with bread is wise.

Wheat has been cultivated through long ages in many countries, and we can not discover where it first grew. The Chinese believe that wheat was a direct gift to them from Heaven; and each year, they have a great public celebration at which the sowing of wheat is made a special feature. In early times, it was largely raised about Rome and in such common use as food that during a period of three hundred years, the people lived on little else than wheat groats. Europe is now the greatest wheat producing continent, raising about as much as North and South America together. It appears that wheat was not grown in America before Columbus' discovery. Since then, such rapid progress has been made that the United States produced for many years more wheat than any other single country in the world, but recently Russia has grown the largest crops. Very great areas are devoted to wheat in India, France and Austria-Hungary. During the last fifty years, there has occurred in the United States a gradual westward movement of the center of wheat production. The first noted wheat area was in and about the Genesee valley of New York State; later the Miami valley region of Ohio became favorably known; while in recent years, Kansas has been the largest wheat producing state.

If we examine a kernel of wheat under the microscope we find it to be made up of several layers. The outer one is quite hard. To this, the name husk, or bran, has been given. (It has no food value, as human beings can not digest it.) The next layers are rich in proteid. From them, the gluten, so valuable in bread making, is produced. (By chewing grains of wheat, we can obtain a grayish, tough, gummy substance, which is mainly gluten.) The center of the grain consists, to a great part, of starch. The tiny germ, or young plant, found at the lower end of the grain, contains some oil.

A great many food substances are manufactured from wheat. The whole grain after the husk has been removed, is made into rolled wheat and puffed wheat. When the grain is cut into several pieces, it takes the name of cracked wheat. By grinding the inner portion of the kernel somewhat coarser than flour, preparations called cream of wheat, or farina are obtained.

In the United States, wheat is the grain mostly used for the manufacture of flour. Of this there are various grades. The fine, white, starchy flour comes from the central portion of the kernel. (In several of the old languages the word wheat means "white.") Whole, or entire wheat flour is not an exact term, as part of the bran has been removed. Naturally, this flour is nutritious, and of a dark color. Graham flour, as made at the present time, is often only a low grade of wheat flour to which the miller adds some bran. Macaroni, vermicelli, and similar preparations are manufactured from flour mixed with water to form a stiff paste which is pressed into shape by machinery and then dried. These foods have good keeping qualities and are quite nutritious. (Occasionally, a dish of macaroni and cheese may well be used instead of meat.) When buying macaroni, it is best to select that of a deep creamy tinge, or even slightly brown. Such macaroni—generally made from a hard wheat, Durum, is the most nutritious kind. Also, it retains its shape well when cooked. The very white macaroni, manufactured from soft, starchy wheat, has less flavor, and gives little nourishment. It is likely to break while cooking, making a sticky, unpleasant looking mass.

Wheat middlings, made from that part of the grain lying between the bran and the starchy center, are used in Boston brown bread, and in certain other breads, common among our foreign population.

The by-products of wheat have considerable commercial importance. From wheat starch is made a paste or size used in various manufactures. The bran has long been known as one of the best feeding stuffs for domestic animals. For the straw there are several common uses: As a bedding for animals; as a fuel during harvesting on the large wheat farms of the West; as a packing for breakable articles. In Italy, a certain kind of wheat straw forms the material for the noted Leghorn hats.

CORN.

Chemical Composition.

Carbohydrates 68.9, water 12.5, proteid 9.7, fat 5.4, cellulose 2., mineral matter 1.5.

In ancient times the word corn meant any kind of cereal grain used for food. Even at present, in England, wheat is often spoken of as "corn," while in Scotland, oats are called "corn." But in the United States, the term is applied to maize or the Indian corn. Our word maize is said to be derived from mahiz, the Haytian name for a kind of native corn bread offered to Columbus. The plant is thought to be native to America because Columbus found that it had been in cultivation by the Indians long before he discovered the country. So strange did the plant appear to him that he carried back to Europe a few grains as a curiosity.

From the days of the first colonists, who were saved from starvation by the maize that the Indians had taught them to raise corn has been of importance not only in agriculture, but in the general progress of the country. At present, it is the greatest of our staple products. The United States supply at least two-thirds of the world's corn crop. The noted corn producing states are Illinois, Iowa, Nebraska, Missouri, Texas, Kansas, Indiana and Ohio.

There are very many varieties of corn, those most common being dent corn, which shows a depression in the outer end of the grain; flint corn, so named from its hard, smooth kernel; sweet corn, rich in sugar and shriveling when ripe; and pop-corn, with small ears and small kernels. "Seed corn" is the name given to especially fine ears of any variety, selected for planting.

The height of the plant varies from about two feet in certain dwarf varieties to twenty feet or over in some strains growing in Mexico and South America.

Ears of corn vary in length from an inch in some kinds of pop-corn to fifteen inches or more in the dent varieties.

The kernels of some kinds are no larger than a grain of rice, while in a South American variety (cuzco) each single kernel may weigh thirty-five times as much as a pop-corn grain.

When ripe, the kernels are white, yellow, red or black, with variations. The two kinds commonly raised are yellow and white.

Many degrees of hardness appear, some being quite soft, while others, the flint varieties in particular, are noted for their hardness.

As corn is quite liable to "mix," neither sweet corn nor pop-corn should be planted near field varieties.

Of such moment to trade is the correct inspection and grading of corn that both state and national governments take part in it. The amount of moisture in the grain proves to be an important feature. A variation of even two or three per cent may fit it for some purposes and unfit it for others.

More than one hundred different kinds of article are manufactured from the corn plant. The outer part of the stalk may be made into paper. The pith is employed as bulkheads in battleships; also in the manufacture of varnish, gun cotton and other articles. Mattresses are made from the husks. Corn supplies the material for nearly all of the starch, and large quantities of the glucose, alcohol and whisky made in the United States. From the germ there is extracted an oil called corn-oil which has been found valuable in making a substitute for India rubber. It is made into rubber gloves, boots, hot water bags, and the cheaper grades of rubber. The oil proves useful also in soap factories.

Even the cobs have been found of worth. When mixed with highly-concentrated grains and ground, they possess certain advantages as stock feed. Large quantities of cobs are used, also, in the manufacture of corn-cob pipes.

Among the best-known manufactured food products from corn are hominy, flaked hominy, hominy grits, corn-meal (yellow and white) and corn starch. All of these are made from the ripe grain which has been well dried. As the outer coating on the kernel is extremely tough and indigestible, it is generally taken off by the use of chemicals before the corn is dried. For this purpose wood-ashes have long been known in the making of old-fashioned lye-hominy.

Sweet corn, although gathered unripe, in the soft, milky state, may be kept for winter use by drying, salting or canning.

Cornmeal mush, boiled hominy, cornstarch puddings, and other dishes made from fully ripened grain are heating to the system. So it is wise to serve them in winter rather than in summer. As corn is somewhat lacking in proteid, it should be used with milk, or similar food. Cornbread and buttermilk, a favorite combination in the South, forms a hygienic lunch.

Corn, because lacking in gluten, can not be made alone into loaf-bread with yeast. The meal may be used for this purpose, however, if mixed with a rather large amount of good wheat flour. For small breads raised with baking powder or similar mixtures, cornmeal is very suitable. A number of the old-time corn breads are made without leavening. This method applies to the Mexican national bread, thin corn cakes, called "tortillas;" also to the hoe-cake and corn dodgers which are still made as they were by the first colonists, who learned these dishes from the Indians.

OATS.

Chemical Composition.

Carbohydrates 59.1, cellulose 12., proteid 10.9, water 10., fat 4.5, mineral matter 3.5.

It is thought that this grain was first cultivated by the peoples of Northern and Central Europe, but not until many years after wheat had become well known. Oats have an advantage over wheat in thriving in a cold climate.

Oatmeal and rolled oats are the two best known food preparations manufactured from oats. This grain contains much starch and fat, hence gives heat to the body, and is well suited to the winter's diet. If eaten in summer, the amount should be small, else it is likely to cause a rash similar to prickly heat. It is wise to use very little, or no sugar on oatmeal, for the reason that sugar adds to the heating properties of the dish. When served with milk, oatmeal forms a strengthening and cheap food. It is best suited to those living an active out door life.

If oatmeal is thoroughly cooked, it forms an advantageous article of diet for rapidly-growing children. It appears to aid in forming strong teeth, and a well-developed bony structure throughout the body.

On account of a lack of gluten, oats do not supply material suitable for making loaf bread. Oatmeal may,

however, be mixed with wheat flour, for bread raised with either yeast or baking powder. The Scotch have a commonly used form of unleavened oat bread. This, one of the primitive breads, is spread out in a thin sheet on a griddle and baked until crisp. It has the advantage of being both palatable and nutritious.

The straw from oats is used in making coarse paper and pasteboard; also, as packing material, mattress filling, and fodder and bedding for animals.

RYE.

Chemical Composition.

Carbohydrates 72.3, water 11., proteid 10.2, fat 2.3, cellulose 2.1, mineral matter 2.1.

Rye may be grown on soils too poor for any other grain. It will ripen in colder regions than will most of the cereals, but produces best in latitudes suited to wheat. Russia is the great rye-producing country of the world.

As a food material, rye is commonly used in the shape of rye flour and rye middlings. Either of these may be cooked as a gruel.

Middlings forms an ingredient of Boston brown bread. In the United States rye flour is used mainly for making rye bread, but this meets with less ready sale than wheat bread. The colonists of New England, however, long made from rye and cornmeal a bread called "rye and Indian." Abroad, rye ranks close to wheat as a bread-stuff. It forms the basis of the peasant's bread of Europe, the Germans making an especially dark form known as pumpernickel.

For persons taking but little exercise, rye bread proves more beneficial than bread made from fine wheat flour.

The straw from rye has much the same uses as that from oats. The rye straw, however, is longer and tougher. In our Eastern States, many farmers grow rye for the straw rather than for the grain.

RICE.

Chemical Composition.

Carbohydrates 79.4, water 12.4, proteid 6.9, mineral matter 0.5, cellulose 0.4, fat 0.4.

Although there are many varieties of rice, they may all be classed as (1) upland, known also as dry or mountain rice, and (2) lowland or wet rice. The former can thrive

with but little moisture. Lowland rice grows well only on lands which are occasionally flooded. This variety forms the great bulk of the world's rice crop.

One half of the human race use rice as their principal food; and it has been cultivated in the East from very remote times. Of such value is this cereal in China that for over four thousand years, the various emperors, in order to encourage the industry, have gone to the rice fields once each year, and sown some rice with their imperial hands.

Rice was not grown in the United States until about the end of the eighteenth century, South Carolina being the first state to plant it. The culture spread so rapidly that before the Civil War rice had become one of the staple products of the country. Since the abolition of slavery, it has been difficult to obtain help in caring for the crop, and the quantity planted now is small. Louisiana and Texas are at present the two largest rice producing states; but the grain is inferior to that of the South Carolina rice, which has always been noted for its fine appearance and good cooking qualities.

Within recent years, machinery used in the cultivation of wheat has been adjusted to suit rice. By this means, the crop is managed more easily than in former times.

After the harvesting, the grain in the husk or "paddy" is taken to the rice mills. Here the husk and bran are removed, and the grains receive a polishing by rubbing against each other in a large revolving cylinder. Thus there is produced a white, glistening kernel of almost pure starch.

Because rice contains scarcely any fat, it proves a suitable food for summer use.

Rice is found to be very easily digested. If thoroughly cooked, it may in many cases be allowed to invalids or children with whom other cereals do not agree.

Besides its value as a food material, rice has other important commercial uses. Rice starch is made in considerable amount and used in laundries and muslin factories. Rice polish and rice bran prove to be quite good feeding stuffs for animals. Rice hulls are used as packing about breakable articles. The Asiatics make intoxicating liquors from the rice grain.

BARLEY.

Chemical Composition.

Carbohydrates 69.5, water 12.3, proteid 10.1, cellulose 3.8, fat 1.9, mineral matter 2.4.

Barley is said to have been the first grain cultivated by mankind. Evidently the ancient Egyptians raised it, for we are told in Exodous, that the noted plague of hail injured the barley. Among the Romans it was highly valued, being one of the special foods used by gladiators. Probably all of the early peoples made bread from barley and it continued to be the chief bread plant of Europe until the sixteenth century. The Scotch peasants still have their barley bannocks. In Japan, a staple food is prepared from soy-bean and barley. Americans seldom use it except in soup or to make a nutritious drink for invalids.

Barley thrives in a wider range of climate than will any other grain, being grown as far north as Iceland and as far south as India.

Brewers use barley to a great extent. It is of much value also in the manufacture of commercial yeast.

In many parts of the world barley forms an approved feeding-stuff, especially for horses.

BUCKWHEAT.

Chemical Composition.

Carbohydrates 61.3, water 13., cellulose 11.1, proteid 10.2, fat 2.2, mineral matter 2.2.

At first buckwheat was called beechwheat, because its three-sided seeds were shaped like the beech-nut. The name blackwheat has also been given it, on account of the outer color of the seed.

Buckwheat is sometimes grown for the use of bees in honey making. Japanese buckwheat proves especially good for this purpose.

In Russia, buckwheat porridge has a place among the staple foods. In the United States the grain is generally ground into flour, in which form it is well known as the main ingredient of buckwheat cakes. These, having long been popular in Holland, were probably introduced here by the Dutch.

Bakers like buckwheat flour for sprinkling bread boards because it does not become so sticky as wheat flour.

Wheat middlings are often used to adulterate buckwheat flour; and a pure form of the flour is now difficult to obtain.

The grain of buckwheat, also the green plant and the straw are used to some extent in feeding farm animals.

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POTATOES.

Chemical Composition.

Water 75.5, starch 20.7, proteid 2., mineral matter 1., cellulose 0.8.

The potato, usually called the Irish potato, the common potato, or the white potato, is thought to be native to the mountainous districts which extend from Chile to Mexico.

It was cultivated and used as food by the early tribes before the discovery of America. The Spaniards, in the sixteenth century, took it from Peru to Europe, where it was planted in gardens as a curiosity. Sir Walter Raleigh thought it such an odd growth that he brought it to the knowledge of Queen Elizabeth. In Scotland, many persons objected to the vegetable for religious reasons, saying that the Bible made no mention of the potato. At first it was believed to be a food fit only for swine and cattle. Later, people decided that on account of its great yield it might be a good food for the poor in times of famine due to failure of the grain crops. Its cultivation first became general in Ireland—whence its name. Very little is known about the history of the potato plant as a North American crop. From an early period, the Indians have used the wild potato, but they seem to know nothing of its cultivation. About the time of the Revolutionary War, the

colonists appear to have had only two varieties, a white and a red. Today, it is not unusual for experiment stations to make tests on several hundred varieties at one time.

The part of the plant used is the underground stems, called tubers, which are fastened to the root.

Potatoes usually grow entirely underground, but sometimes the earth is washed away, or they grow close to the surface. In such cases, a green color develops. They are then called sunburned, and have an unpleasant bitter flavor. Any green portion should be cut away before cooking or the potato may prove unwholesome.

When one wishes to keep old potatoes from sprouting and withering, they may be placed in boiling water for a few moments. The heat kills the sprouts. Potatoes so treated should be spread out on a flat surface, and dried thoroughly before being stored away. They remain almost as good as new until new potatoes come into market. Dealers often treat them in this way in order to obtain high prices in the spring.

Although the potato is considered a starchy vegetable, it contains only about 20 per cent of starch. On account of its large amount of water—over 75 per cent—the potato may be cooked by the dry heat of baking, quite as readily as by boiling. The starch of a baked potato really cooks in the vegetable juice.

Baking is one of the most economical and healthful ways of cooking potatoes, because the tough skin seals all of the nutritious matter within. When preparing potatoes for baking, the skin should never be cut, as this allows some of the juice to escape.

Boiling, with their "jackets" on, is almost as economical as baking. When pared before boiling, some of the nutriment dissolves in the water during the cooking. Loss occurs also if potatoes, after being pared, are allowed to soak long in water. An exception may be made of old, waxy potatoes, which are improved by soaking before cooking, as this method draws out some of the gummy substance which is objectionable.

When removing the skins from potatoes, the paring should be as thin as possible, both to prevent general waste and because the proteid of which the potato contains very little, lies directly under the skin.

Fried potatoes, even though carefully cooked, can not be considered wholesome. The particles of starch, being coated with grease, are not acted upon readily by the digestive juices. Besides, in the hot grease there is developed an irritant acid, which frequently causes indigestion.

Since potatoes contain no fat, and very little proteid, they should be used with fatty foods, as butter, cream, or bacon, and with proteids, as milk, cheese, eggs or meat.

Aside from its usefulness as a food, the potato has considerable commercial value. Its starch, being a cheap form, is used in the manufacture of laundry starch, and of dextrin (the sticky substance placed on the back of postage stamps). Potato starch forms the basis of commercial glucose, which is made in very large quantities.

SWEET POTATO.

Among civilized nations, the sweet potato was known long before the Irish potato. Indeed, until about the middle of the seventeenth century, whenever the word potato was used, it meant the sweet potato. This does not belong to the same botanical family as the Irish potato. The sweet potato is the true root of the plant. In composition, it differs from the Irish potato mainly in containing sugar. Probably this is one of the reasons—since sugar readily absorbs water—that sweet potatoes must be stored in a dry place. If kept where it is damp, they soon become moldy or rot. For winter use they should be packed in cotton seed, sawdust, bran or dry sand; and they must be "bone dry" when put away.

Sweet potatoes may be cooked and served in much the same ways as Irish potatoes.

The yam closely resembles the sweet potato in color, flavor, texture, and to some extent in general appearance. It is the fleshy, edible root of a plant growing originally in India, where it has been cultivated for centuries. In all varieties the size is large, 20 lbs. being no unusual weight. Thus the crop is difficult to gather, needing careful dig-

ging. In our Southern States, the name yam is commonly given to several large kinds of sweet potatoes which contain much sugar and are better liked than those having more starch.

Readings:—Food Products of the World (Greene), chap. xxii, on "Tubers and Succulent Roots;" Home Life in Colonial Days (Earle), pp. 144-145; Potatoes as Food, Farmers' Bulletin No. 295.

SUGAR.

The main sources of sugar are the sugar cane, sugar beet, and sugar maple. It occurs also in honey, in most fruits, and in some vegetables.

Nearly all of the world's supply of sugar is obtained from the sugar cane and the sugar beet, each furnishing about half of the amount.

CANE SUGAR.

Cuba leads the world in the production of cane sugar, while Java is a close second. In the United States, Louisiana produces a large amount—about one-third as much as Cuba.

The sugar cane is a strong-stemmed grass, which sometimes grows as high as 20 ft. It is native in the East Indies. The Crusaders brought it to Europe. In the fifteenth and sixteenth centuries it was planted by the colonists in the warmer regions of America.

Just before the plant flowers, the juice in the stem is sweetest and in greatest amount. At this time the cane is cut, the work being done by hand, with the use of a cane knife or "machete." Thus far, machine cutting has not been a success.

As the juice quickly ferments, at a loss of sugar, the cane, immediately after cutting, is started for the mill. Here it passes under a series of heavy rollers, which press out the juice. This, after being boiled down to a rather thick syrup, is allowed to cool, and part of it separates out in the form of crystals. This is called raw sugar. It has a brown color, and coarse texture, and contains many impurities. To remove these it is passed through bone charcoal. There are also many other processes in refining the sugar.

The liquid portion which will not crystallize, and which is drained off the raw sugar, is known as molasses. In the old time "sugar house" or "open kettle" molasses much of the sugar remained in the liquid. Such molasses was rich and of fine flavor. Scarcely any of this kind is made now. Manufacturers of the present day let the molasses stand for weeks or even months. Thus they obtain a second and sometimes a third grade of sugar. Finally the molasses becomes so poor that it is used as a fertilizer or thrown away. There is on the market, an imitation molasses, made from glucose, to which a little true syrup is added for giving color and flavor.

In making granulated sugar, raw sugar syrup, after being purified, is put into large cylinders which revolve rapidly, thus keeping the sugar stirred up and "grainy." The syrup which drains off these crystals is clear and of a more delicate flavor than molasses, and is called table syrup.

Loaf sugar, one of the purest forms of sugar, takes its name from the high, rounded molds into which the syrup is run. After hardening, and being sawed by machinery into smooth blocks, it becomes known as cut loaf, or block sugar. A poorer grade is made by pressing granulated sugar into cubes. This may be detected by the very regular size and smooth surface of the blocks.

Pulverized sugar is obtained by grinding the broken pieces which remain after sawing the loaf sugar. Pulverized sugar seldom appears nowadays in an adulterated form. It tastes less sweet than most other classes of sugar, merely because its very fine particles do not readily impress the nerves of taste.

SORGHUM.

Certain kinds of sorghum—a plant belonging to the grasses—yield a sweet juice which was formerly used largely in making syrup. Except in our Southwestern States, this is seldom seen in the markets at the present time, a cheap form of glucose having taken its place.

Although the National Department of Agriculture has made many experiments on sorghum, it does not thus far rank as an important sugar yielding plant. There are two

main reasons for this, one being the low sweetening power of sorghum, and the other, the difficulty of purifying its juice.

Home-made sorghum syrup is very satisfactory for cooking purposes, both by reason of its flavor and of its acid reaction with baking soda. In these ways it is far superior to the glucose product.

BEET SUGAR.

The beet used for sugar manufacture was, at first, not different from the common garden beet, but by careful selection and culture, through many years, the sugar beet has become changed in various ways. Not only does it yield more per acre, but its sugar content is much higher than in former times. The average yield of sugar from beets in the United States is 13 per cent, but there have been many produced which give as high as 23 per cent.

For several years, the National Department of Agriculture has been experimenting on the beet seed, the desire being to improve the seed itself and to increase the home supply so that our country need not depend on imported seed.

The sugar beet industry of the United States is constantly gaining in importance. At present, California, Michigan, Colorado, Arizona and Utah raise large crops.

Beet sugar was first manufactured in the early part of the nineteenth century in Germany and France. The industry still flourishes in both of these countries. The sugar beet crop is important also in Russia and in several other parts of Europe.

In fact, only about a century's time has been needed to prove this homely kitchen-garden vegetable a powerful rival of the "noble plant" which formerly made fortunes for English and Spanish colonists.

After the beets are harvested, they are taken to the sugar factory. Here they pass over stone catchers, which separate stones and coarse bits of dirt from the beets. They are then well washed, cut into thin strips or slices and placed in water—heated to a certain temperature—for one hour. The sugar from the beets dissolves out into the water. Lime is used to remove impurities. The juice also

needs to be filtered, cleared and boiled at a low temperature to drive off surplus liquid, when the sugar will finally form into crystals. The entire process requires great care.

From the chemist's standpoint, the sugar obtained from the beet and the cane are alike. When the two sugars have been carefully refined, no difference can be detected in either appearance or flavor. They are both made into exactly the same forms of sugar for trade use. The housekeeper finds, nevertheless, that canned fruits keep better with the addition of cane sugar than with beet sugar. Table molasses is not manufactured from the sugar beet, because no way has been found of removing the impurities, and the molasses has an unpleasant flavor. It is generally counted a waste product, and used as a fertilizer, or made into alcohol. The pulp, another by-product, forms a valuable cattle food. It may be used fresh, preserved in silos or dried.

MAPLE SUGAR.

This sugar is obtained from the sap of certain kinds of maple trees, the sugar or rock maple being most commonly used for this purpose in the East, and the red or swamp maple in the West.

In our country the tree grows mostly in Vermont, New York and Ohio. Canada, also, has many a "sugar bush," as any thicket of such trees is colloquially called, although the terms orchard, grove, place and works are sometimes used.

During the early spring, just before the buds start, the trees are tapped. Warm days with frosty nights make ideal sugar weather. The length of the season is always uncertain because even a few very warm days will start the buds and foliage, and after this the sap becomes small in quantity, and of a poor flavor.

In tapping the trees, a hole is bored in each a short distance above the ground. There is then driven into the hole a small wooden trough or a galvanized iron pipe, through which the sap may flow. It is led into pails whose contents are collected each morning and evening.

The sooner the sap is boiled after leaving the tree, the better the grade of syrup. Hence, a place for cooking it, generally called a "sugar camp" is arranged near the grove.

Methods of boiling down have much improved since the time of the early colonists who found the Indians boiling the sap by means of hot stones dropped into it. Now, after the sap is boiled in vacuum pans to the thickness desired, it is generally run at once into cans which are then sealed air-tight. For sugar, the sap receives longer boiling, and is stirred briskly until graining begins, when it is poured into molds to harden.

In general, the sap yields about 3 per cent of sugar. The clearest and best flavored sap is obtained early in the season. From it, light-colored sugar and syrup are made. These, called "first-run" bring the best price. The poorest grades, dark and strong, are used in the manufacture of chewing tobacco.

As the supply of maple products is small compared to the demand, persons living at a distance from a sugar maple region frequently have difficulty in obtaining a pure article. Both the syrup and sugar are often adulterated with brown sugar. As our pure food laws require correct labels, the manufacturers of mixed products cleverly print on their cans "MAPLE and cane SYRUP" or "cane and MAPLE SYRUP." The former title is used when the amount of maple is fairly large, while the latter shows that there is much cane. In either case, a careless buyer, who glances only at the prominent words, supposes that she is obtaining true maple syrup.

HONEY.

The ancients knew nothing of sugar, and used honey altogether for sweetening. Thus, it was of much more importance than it is now. For instance, the Hebrew spies, in praising Canaan described it as a land "that floweth with milk and honey." Again, the gods of ancient mythology were thought to use as their beverage a mixture of honey and water. Even after cane sugar began to be manufactured, many persons thought honey the more wholesome for general use and took sugar only as a medicine.

The flavor of honey varies with the source from which the bees obtain the nectar. While clover honey is generally taken as the standard for excellence, linden, basswood and

white locust honey are pleasing. In very warm, dry seasons, alfalfa is satisfactory. Buckwheat has rather a decided flavor which some persons dislike.

Age affects the flavor of honey. As a rule, the newest and best is clear, light in color, and contained in white comb. Older honey usually grows dark, and sometimes crystals form, making it cloudy and thick. Honey should be kept in a dry place. When damp it becomes thin and may sour. Freezing causes the comb to crack and the honey oozes out.

Honey is sold either in the comb, or extracted from it. This latter form can not always be found pure. It is often adulterated with starch glucose. Another grade inferior to pure extracted honey is called strained honey. For this, broken combs may be used.

Although in the United States, honey is eaten mainly on account of its flavor, it has quite a high food value. It proves, also, somewhat more digestible than cane sugar. These facts are known to Alpine climbers who carry with them on their journeys, cheese and honey—both foods giving much nourishment in small bulk.

GRAPE SUGAR, MILK SUGAR AND OTHER SWEET SUBSTANCES.

Among other less well-known sugars are grape sugar and milk sugar. The latter, obtained from milk, is not so sweet as cane sugar. It is used in certain foods for infants and invalids, and in medicine—being familiar in the pellets of the homeopathist.

Grape sugar may sometimes be seen as a pale yellow grainy substance on the outside of dried fruits—raisins in particular. It occurs mostly on those which have been kept for a long time after drying. Glucose is another name used for grape sugar. However, the term glucose, or commercial glucose is generally given to a kind of sugar manufactured from starch. It also bears the name of starch sugar. In Europe this is made from the potato, in America, from corn. The industry has grown to be a large and important one.

Commercial glucose is made in two forms, dry and liquid. The latter form, a colorless thick syrup meets with

ready sale among confectioners. They use it because in cooking it does not become grainy as cane sugar is likely to do.

For some two thousand years there has been made in Japan a sweet substance called ame. This is produced from starch—usually that of rice or millet—by the action of a ferment. There are two forms, a clear yellowish liquid, and a solid somewhat resembling white candy.

The material named saccharine has a much greater sweetening power than sugar. It is, however, not a sugar, but a coal-tar product. Because such minute amounts are needed for sweetening, it is sometimes allowed in certain diseases where sugar would be injurious. Persons in health should not substitute saccharine for sugar, since the human system can not use saccharine as a source of heat. When manufacturers add it to canned goods to take the place of part, or all, of the sugar, it must be considered an adulterant.

EFFECTS OF SUGAR ON THE HUMAN SYSTEM.

Sugar, like starch, furnishes heat in the body. Of the two substances, sugar is the more easily dissolved, and can be made use of more quickly by the system.

If a person eats a larger amount of sugar than the body needs at the time, the surplus is stored up in the form of fat. It has been said that the negroes of the West Indies grow fat during the sugar season, when they chew the cane as they work.

Possibly most Americans eat more sugar than is good for the health. Experiments go to prove that four ounces—about four rounded tablespoonsful—daily is the largest quantity that can be taken without injury. For many persons, a smaller amount is wise. Should much sugar be eaten at one time, its ill effects are often shown by a rash on the face. Candy is least likely to prove injurious if taken at the end of a meal. It should never be eaten shortly before meal time, because the sugar, being quickly absorbed, satisfies the appetite for awhile, and thus one does not take enough substantial food at the following meal.

Some physicians say that the "sweet-tooth" of children shows a natural and healthy craving—the sugar being

needed in their rapid growth. Rock-candy and home-made molasses candy are wholesome sweets, if used in moderation. Both children and grown persons do well to avoid any highly-colored cheap candies, as such have often been found to be injurious and sometimes even poisonous.

THE COOKING OF SUGAR.

The longer sugar is cooked, the less sweet it becomes. Hence, when making desserts or cooking fruit needing sugar, it should be added as near to the end of the process as possible.

If sugar be put in a pan, without any water or other liquid and heated on a stove, the sugar gradually melts, turning to a brown syrup, which has little or no sweetness. It is then called caramel (not caramels), and may be used as a coloring and flavoring in soups and sauces.

It is curious to note that although at the present age the yearly output of candy is worth many millions of dollars, the article was scarcely known until the beginning of the nineteenth century. Previously candy had been made chiefly by physicians or apothecaries who mingled honey and sugar with medicines in order to conceal any unpleasant taste.

Readings: Sugar as Food, Farmers' Bulletin No. 93; The Fairy Land of Science (Buckley), pp. 193-235; Home Life in Colonial Days (Earle), pp. 110-114; 155-158; Outing for October, 1907, on "Hunting the Wild Honey Bee;" Scientific American Supplement, August 10, 1907.

FAT.

Fatty or oily foods are obtained from animals and plants. Broadly speaking, it may be said that animals supply fat, and plants oil. The main difference between fats and oils is that the latter are liquid and the former solid. However, a substance may appear as a fat at a low temperature and as an oil at a high temperature. Thus, butter which is a solid during cold weather, becomes oily during the heat of summer.

The fats used as food are contained mainly in meat, poultry, fish, game, cream, butter, olives, olive oil, cotton-

seed oil, nuts, and chocolate; certain kinds of cheese have much fat. It occurs also in the cereals and in the yolk of egg.

Fatty foods are of value to the human body in supplying material for heat and energy. Thus, they act in the same way as starch and sugar. Fat, however, gives about 2 1-4 times as much heat as starch. For this reason, one should use, during winter, a larger amount of fatty foods than in summer. The Eskimo child, so travelers tell us, contentedly munches on whale bubble the livelong day. (This is more sensible than the chewing gum habit of the American child.)

Any fatty food which is not needed at once in the body goes to build up fatty tissue. It is well to have a reserve supply, as in case of fever or other wasting disease the fat burns up first and thus saves the muscular tissue. The reserve fuel is useful also when the body must endure severe or long-continued cold.

Fats in the diet assist in keeping the lungs healthy. The natural work of these organs is to cast off waste matter from the fatty foods and carbohydrates. Like every other part of the body the lungs must have exercise. So, when they seem to be diseased, the physician at once prescribes cod-liver oil, cream, butter or similar articles. Since prevention is better than cure, it would be wise for Americans to take more of the fatty foods in their regular diet.

Fats aid also in keeping the nerves in good order. The nerves contain a greater proportion of fat than the body in general. It is a well-known fact that fat persons are seldom nervous. Perhaps their nerves give no trouble because well-fed and healthy.

Acid fruits and vegetables are believed to aid in the digestion of fat, as the acid separates the globules of fat, making a sort of emulsion. For this reason, cranberry sauce is served with roast turkey, and apple sauce with pork. Likewise, sauer kraut is used with meat by the Germans.

In cooking fatty foods, the heat should never be greater than necessary. When fats become very hot, they prove irritating to the digestive organs, often causing a person to have indigestion or heartburn. Thus, rich cakes and

pies can not be classed as wholesome foods. It is probable that apple, cherry, or other acid fruit pies are the least objectionable.

Of all the fatty substances used in cooking, olive oil is by far the most delicate. Unfortunately, many Americans do not like its flavor. Yet the taste appears to be growing, perhaps because of the fine quality of oil put out by various California firms. Nor have our people in general learned to eat the ripe olive in which the percentage of oil is high. The green olive, meeting with ready sale, contains much less nutriment.

In the United States, the culture of the olive is scarcely known outside of California, but in that state it forms a large industry. Olive trees were first raised in California by the early Jesuit missionaries who also brought the plant to Mexico. For long ages the olive has been cultivated both for the fruit and its oil in the regions about the Mediterranean. If intended for oil, the olives need to be picked when slightly under-ripe. The fruit must not be bruised, nor allowed to stand long after picking—else the color and flavor of the oil will be poor. The fruit is crushed and pressed much like apples in making cider. There are several pressings. The oil from the first, called virgin oil, has the finest flavor. In Italy, Spain and southern France, olive oil is used in nearly all those dishes which need some form of fat.

Cottonseed oil is now so well refined that it competes with olive oil in delicacy of flavor. For general cooking purposes, cottonseed oil, mainly because of its cheapness, takes the lead in the United States. It is often shipped to Europe, there put into bottles labeled "pure olive oil," and returned to this country to sell at a price much above its first cost.

The fish canneries on both our Atlantic and Pacific coasts use immense quantities of cottonseed oil; while it is sold to more than forty foreign nations.

Cottonseed oil mixed with suet forms cottolene, cotto-suet, and similar manufactured articles.

It is interesting to note that cottonseed, which formerly was thought a nuisance by the farmer and used only as a fertilizer, or burned, may now bring one dollar or over for a hundred pounds, at the cotton gin, and is much more valuable when made into oil, oil-cake, etc.

Fats and oils are useful preservatives of many foods, on account of keeping out air, and preventing dryness and putrefaction. Sardines are a well known example of fish preserved in this way. Layers of lard have long been used to protect jars of potted meat, sausage, etc. A coating of melted fat is sometimes applied to eggs to keep them for future use.

BUTTER.

Chemical Composition.

Fat 93., water 5.34, mineral matter .95, proteid .71.

Before the Christian era, butter had been given a place among foods; but in early days, it was used mostly as a salve for wounds, or as an ointment for the skin after bathing. Also, it was burned in lamps instead of oil.

The ancients made butter from the milk of sheep or goats. It was churned in a skin bag which was hung to the branch of a tree and swung back and forth until the butter formed. This butter must have been a very poor article. It was not solid, but liquid, as old writers speak of pouring it out.

Only within recent years has butter become a staple article of food. In southern Europe, it is still not used to a great extent, as oil from olives and other sources takes its place. Denmark ranks at present as the great butter exporting country of the world, while Holland stands a close second. (Both of these countries buy large amounts of our cottonseed oil for adding to butter which they ship to India and other tropical climates.) In the United States, the growth of the butter industry has been rapid since the introduction of the creamery system. The most noted butter producing states of the present day are Minnesota, Wisconsin, Iowa and Nebraska. Illinois formerly had a valuable output, but of late the milk-condensing interests of the state have lessened the manufacture of butter.

From whatever source butter is obtained it consists chiefly of the fat of milk, with a little water, proteid and mineral matter. But no two makers ever turn out butter exactly alike. It may vary greatly in texture, flavor or color. For each of these variations there are many causes. The texture is often affected by the method of churning, by the temperature, or by the food which has been given to the animals. (Cottonseed meal, if fed in liberal amount, causes a crumbly butter.)

In large factories, the flavor is kept alike at all times by putting into cream a certain kind of bacteria. The flavor of home-made butter may be unpleasant if the cream has been stored near fish, onions, or other articles having a decided odor.

With the natural color of butter, although it is pale in winter, we should be satisfied. Unfortunately, most persons like to see, at all seasons of the year, a bright golden yellow. This shade, so far, has been produced only from aniline, which is prohibited by law. Nevertheless, butter of this color may still be found in markets. The old-fashioned dye, annatto, obtained from the seed of a Brazilian plant gives a less pleasing tinge, but is not unhealthful.

In the United States butter made from sour cream is generally liked better than that from sweet cream. Also, the yield of butter is somewhat greater from sour cream than from an equal amount of sweet cream. In our country, most persons prefer butter to which salt has been added. Abroad, unsalted, or "sweet" butter is considered the better. Cream used in making such butter must be well cared for and free from any unpleasant odor and flavor. Unsalted butter is likely to turn rancid more quickly than that which has been salted. In packed butter, salt is largely used as a preservative. It checks the changes in the proteid (casein) and in the fatty acids which spoil the flavor. Sugar has about the same effect as salt. It is said that butter covered with syrup will keep even better than when salted.

If butter becomes rancid, it may be somewhat improved by melting and shaking with boiling water. This causes the casein and fatty acid to separate out. The mixture should then be chilled at once, either by pouring ice water into it, or by putting it into a very cold place. When the butter

gathers in a cake at the top, it should be taken off, and the bottom of the mass scraped to remove the casein clinging to it. Butter treated in this way will not regain its grain.

As a rule tub butter sells for a lower price than print butter, because less time is required in packing. Creameries located in small towns, or in country districts usually put out print butter and tub butter of the same grade. The latter is then an economical form to buy. However, in large cities tub butter often proves to be of poor quality, as, while plentiful and cheap during the summer, large dealers place it in cold storage and do not offer it for sale until winter, when a higher price may be obtained.

Renovated butter is made in great amounts from different grades of poor butter. These are all mixed together, melted and allowed to stand until the curd settles. The mass is then re-churned with milk, colored, salted and packed. It commonly takes the name cooking or factory butter, and often brings nearly as much the pound as good butter. By reason of the impurities held in it, renovated butter easily becomes rancid.

Oleomargarine is generally made from cottonseed oil, purified beef or pork fat, and milk, with a little butter (to give flavor). These are churned together, and the mixture is salted. The present law does not allow artificial coloring although it was formerly added. This rule has lessened its sale considerably. All of the ingredients for oleomargarine are prepared with care, and chemists say that it is much more cleanly than the average butter, and, for this reason, perhaps more wholesome. Another feature in its favor is the fact that it does not grow rancid so readily as butter does. Being made of cheaper materials than butter, oleomargarine should be sold for a lower price. One of the main objections to its use has been that manufacturers often endeavor to sell it as true butter, and thus obtain more than a just price.

Instead of economizing by using a low priced butter for cooking, the wise housekeeper will substitute some cheaper form of fat, such as beef suet, cottonseed oil, or oleomargarine. Chicken or goose grease, if tried out carefully, answer very well in preparing meats, meat sauces, vegetables and soups.

Readings: Butter Making on the Farm, Farmers' Bulletin No. 241; Food Products of the World, (Greene), chap. XVII., on Vegetable Fats and Oils; also pp. 233-237; Milk and Its Products (Wing), pp. 94-162.

MINERAL MATTER.

Mineral matter, also called salts or ash, occurs in all parts of the body, but especially in the bones, teeth and hair. Since there are no foods entirely lacking in mineral matter, it is believed that the body obtains enough of such mineral from the average diet. As a rule, we add to our food only one mineral substance, common salt (sodium chloride). Baking powder, although it contains mineral matter, is used in such small amounts at a time that it does not rank as a food.

Among the mineral matters found in the body, and which must be supplied by the food, are lime, iron, soda, chlorine, potash, phosphorus, etc. Altogether, these elements number from fifteen to twenty. Lime occurs in the bones and teeth, iron gives the red color to the blood, soda strengthens the bile, chlorine helps to form the hydrochloric acid of the gastric juice, potash aids in building up the muscle cells, phosphorus is of much use to the nerves. Thus these mineral matters, though needed in only small amounts, are of great importance.

For our supply of mineral matter, we look mainly to fruits and vegetables.

WATER.

Although water is not strictly a food, yet it forms nearly 70 per cent of the human body. Without it, our lives would last for only a short time.

One of its uses to the system is in regulating the temperature, surplus heat being thrown off in the perspiration. It keeps the blood liquid enough that poisonous waste matter is not retained. (In the spring, after the usual rich heavy diet of winter, the blood is sometimes said to be "too thick." There are several old-fashioned remedies supposed to thin the blood, such as sassafras, sulphur and molasses, etc.)

Water is necessary in the saliva and other digestive juices, in order that food may be readily dissolved.

It also fills out the tissues of the body, thus improving the general appearance.

Not less than three pints of water should be taken daily. It is wise to drink a glass of water before breakfast. The liquid rinses out the mucous which collects in the stomach during rest. If this mucous is allowed to remain, it interferes with digestion.

In regard to the drinking of water at meals, most physicians say that a single glass can do no harm. Large quantities may dilute the digestive juices too much. Ice water, especially, should be taken—if at all—in small portions.

Hard water, in particular that containing a large amount of mineral matter, can not be healthful for the average person. One of the main reasons for using water as a beverage is that it may gather up impurities from the body. But water can dissolve only a certain amount of solid substances. If in its natural state it already holds much mineral matter, it can then absorb only a small amount of waste from the system. Water made hard by lime may be especially objectionable. The lime is said to collect about the joints of the body, causing stiffness.

The source of drinking water is a matter of importance. Cistern (rain) water, if carefully filtered, and from well-built, clean cisterns may usually be found wholesome. The features in its favor are its own purity, and following this, its ability to absorb impurities from the body. Of course, rain water which collects during the first part of a shower should not be allowed to run into the cistern. Such water may hold mechanical impurities or dust laden with disease germs.

Well water from shallow, dug wells, must, in most cases, be regarded with suspicion. Such wells are seldom far enough from either dwelling or barn to be safe from top soil drainage.

Artesian wells, by means of their great depth generally furnish pure water.

Most spring water may be regarded as pure. Sometimes, however, it is unfit for drinking purposes on account of holding salt or other minerals in solution.

When there is doubt about the purity of water, it should be boiled for fifteen minutes to destroy disease germs. This plan is especially wise when there are cases of typhoid in the vicinity. (In China, although the water supply is very bad, typhoid and kindred diseases are scarcely known. This is thought to be due to the fact that the universal drink is tea made from boiled water.) Since long boiling makes the water taste flat, it is well to pour it, after boiling, from one pitcher to another, several times. It thus absorbs air, which improves the flavor.

Small filters for household use are of little benefit. Many of them will remove dirt and other mechanical impurities; but, so far as known, the stone filter is the only kind to strain out disease germs. Many persons object to stone filters because they work slowly, and also because they are expensive. Small filters, made for screwing on faucets, have little or no virtue, except for straining out large particles of dirt.

Distilled water may be counted absolutely pure.

When water used for drinking or cooking purposes runs through lead pipes, the faucets should be turned on for five minutes every morning, so that the water which has stood in the pipes all night may flow away. Otherwise, there may be danger of lead poisoning, as water, especially rain water, easily dissolves lead.

There are several stages in the process of boiling water. When a utensil holding cold water is set on a hot stove, as the water begins to heat, small bubbles may be seen about the bottom and sides of the vessel. In a short time these rise for some distance in the water, and then break quietly. But as the water grows hotter, larger bubbles form, rise to the top, and break. When the water is thus stirred violently, we call it boiling. Its temperature is then, at ordinary elevations above the sea-level, about 212 F. Rapid or long continued boiling will not make it any hotter. So, in cooking most articles, it is a waste of fuel to keep the fire hot enough for brisk boiling. Nearly all foods are better both in flavor and appearance if simmered. (Simmering is cooking so gently that the bubbles are small and

rise only at intervals. The temperature is about 185 F.) For this a low fire may be used, hence there is a saving of fuel.

Strange as it may seem to some, there is really an art in boiling water. If quickly brought to a boil, and used at once, before parting with the air that gives it flavor, it is at its best. When allowed to heat slowly, or to remain on the stove between meals, or if boiled too long, it has a "stale" flavor. This is quickly noticed by persons accustomed to taking hot water as a beverage. (Because of the nicety needed in the proper boiling of water a certain New York City hotel, noted for its good cookery, charges as much for a cup of hot water as for tea or coffee.)

Water, like many other substances, may be a liquid or a solid, according to its temperature. It begins to freeze at about 32 degrees F. In passing to the solid state, instead of contracting, as most substances do, water expands. Its specific gravity then becoming less, ice floats on water. (During winter weather neither cream nor milk should be set away in a glass jar, china pitcher or similar article, which might be broken by sudden expansion, were the liquid to freeze.)

From very remote ages, ice has been used to cool food and drink. In many tropical countries, it is customary to convey ice from the high altitudes to the warmer regions below. Both the ancient Greeks and Romans prepared deep underground pits in which they stored for future use, ice and snow obtained from the mountains. The convenience of having a supply at hand was so apparent that by the close of the seventeenth century dealers in ice and snow were commonly found in France.

Where nature provided neither ice nor snow, primitive peoples invented means of cooling in a small way. For example, water was stored in porous jars. Thus, in a warm atmosphere, it cooled by rapid evaporation. Another method was to surround the vessels with a mixture of coarse salt and water. As the salt dissolved it drew heat away from the liquid within the jars. The same principle applies in the ice cream making of today.

The modern ice industry of the United States began in the early part of the nineteenth century. Sailing vessels

then carried to warm southern ports ice from the rivers and lakes of the north. At about the close of the Civil War the first large ice factory in this country was built at New Orleans. Artificial, or manufactured ice is now used almost exclusively in the Southern States, but in the North natural ice still has much vogue.

From the sanitary viewpoint, the fitness of ice for use in food and drink depends upon the quality of the water supply, and the effect which freezing has upon disease germs. Although freezing tends to purify the water, not all bacteria are destroyed. In addition, there is the fact that ice may collect impurities in the gathering, storing or delivery. Of natural ice in general, that obtained from small ponds or streams near dwellings, is less likely to be pure than that gathered from large bodies of deep still water at considerable distance away from towns or cities.

In making artificial ice those factories where careful methods prevail, use water which has been filtered or distilled, or both. Nevertheless, careless workmen may render the ice harmful.

Ice to be used in food should always be rinsed to remove surface impurities. It is wise to cool drinking water merely by placing it in a refrigerator, or by packing ice about it, rather than by putting ice directly into the water.

Readings: The Fairy Land of Science (Buckley), pp. 73-98; Woman's Share in Primitive Culture (Mason), pp. 25-26; "Water as Food and Drink," Chautauquan, Vol. XXIII., p. 324.

GREEN VEGETABLES.

Chemical Composition.

Typical Example:—Cabbage.

Water 89.6, carbohydrates 5.8, proteid 1.8, mineral matter 1.3, cellulose 1.1, fat 0.5.

The name green vegetables is applied to those commonly used in their fresh or green state. They are also called watery vegetables, because they consist mainly of water. These foods have little or no starch. They contain considerable cellulose. (This is a fine frame work, extending through fruits and vegetables, and helping to keep them

in shape. It may readily be seen as the tough fibres in a leaf of cabbage. In its oldest form, cellulose becomes the true woody fibre of plants. Very little, if any cellulose can be digested by human beings. Herbivorous animals appear able to digest it.)

Green vegetables supply only a trifle of nourishment. They are of much value, however, in our diet because they furnish water in a pure form; also, on account of their vegetable acids and mineral matter which help to keep the blood in good condition, thus warding off scurvy and certain other diseases. They give a pleasing variety to the diet, hence, stimulate the appetite and digestion. Besides, their bulk, due to the large amount of cellulose, has its advantages.

The digestibility of watery vegetables appears to depend mostly upon the amount of cellulose they contain. When this is tender or in small proportion, the vegetable is easily digested. If the cellulose be tough, or in large amount, the vegetable proves difficult to digest.

The various parts of plants used as vegetables include roots (turnip, sweet potato, beet, carrot, parsnip, salsify), tubers (Irish potato, Jerusalem artichoke), bulbs (onion, garlic), stems (celery, asparagus), leaf buds (Brussels sprouts), leaves (lettuce, dandelion, spinach, cabbage, endive), flower buds (cauliflower, capers), flowers (artichoke), fruits, green (cucumber, okra), fruits, ripe (tomato, eggplant), seeds, unripe (corn, peas), seeds, mature (dried beans and peas).

As a rule, green vegetables should be cooked soon after gathering, since they are then at their best in flavor, color, and texture. Because they contain a large amount of water which readily evaporates, they soon wilt or become dry in market. Should this happen, they may be somewhat improved by soaking in cold water for about an hour.

When buying vegetables, it is best to choose such as are in season in one's home district. These have a better flavor and appearance and are less costly than those which have been kept in cold storage, forced in hot beds, or shipped from a distance.

In vegetables sold by weight there is usually less waste if medium sized ones are selected. When buying by bulk, greater value for the money is furnished by those of small size, because they pack together more closely in the measure than do large ones. In case the buying is done by number, it often becomes necessary to decide between quality and quantity. For example, a large cucumber may sell for the same price as one of medium size. The latter will generally be the better in quality, though lacking in quantity. The same rule applies to squashes, peas, string beans, corn, etc.

All vegetables, before being used, need careful and thorough washing in cold water. Certain ones, cauliflower especially, in which insects are likely to lodge, may be soaked, top down, in salted water for a half hour. Lettuce leaves, after their washing, should be lightly dried on a towel. If then loosely wrapped in a dampened piece of cheesecloth or a thin towel, and set in the refrigerator or other cool place, the leaves soon become crisp. Celery may be treated in the same way, and is much better than when the stalks are let stand in water. (This means of chilling the vegetables by evaporation is like the old-time way of keeping butter cool in porous crocks; and also similar to the East Indian method of cooling water.)

Any vegetable intended for serving raw (as celery, lettuce, radishes) must be the best of its kind—tender and young. Only the hearts of celery are really nice for using raw. The coarse outer parts should be set aside for soup, or for stewing. Instead of serving the large inferior leaves of lettuce as a salad, save these for Dutched lettuce, or they are fairly useful when shredded for a garnish, or they may be torn into small pieces and mixed with other salad material.

Such vegetables as are defective in appearance, flavor or state of ripeness may sometimes, by careful cooking and dressing, become quite palatable.

Green vegetables are classed among our cheaper foods; yet, even when care is taken in preparing them, there is much waste. By the time they are ready to serve, some have lost as much as half of their original weight. Potatoes and carrots lose about 20 per cent, lima beans and

peas about 50 per cent, and sweet corn somewhat more. In making soup from peas or corn, one may obtain considerable flavoring material and mineral matter by boiling the pods in the one case and the cobs in the other in the water intended for the soup stock.

The general rule for cooking green vegetables is to plunge them into boiling, salted water, and to let them cook until barely tender. Over cooking ruins both color and flavor.

In most cases it is best to use a moderate amount of water, scarcely enough to cover the vegetables so that by the time the cooking is finished, the water has nearly evaporated. By this means, less of the flavoring matter of the vegetables is lost. Any water remaining may, with but few exceptions, be made into a sauce to serve with the vegetable, or else used in soup.

Salt is added to most vegetables when they are put on to cook. Thus they lose less of their valuable mineral matter than if cooked in unsalted water.

In case vegetables naturally contain some sugar, a small amount of cane sugar may be added to the water in which they are cooked. This merely replaces the sweetness drawn out of the vegetable during the cooking. By such means French cooks have long been accustomed to improve the flavor of peas, corn, carrots, beets, etc.

Some persons add baking soda when cooking green vegetables, but this is a mistake as it spoils both color and flavor.

Generally, a cover should be kept on the saucepan in which a vegetable is cooking, as the heat is thus well retained. Cabbage, cauliflower, onions and turnips are cooked with the lid off because their decided odor, due to a volatile oil, then quickly escapes. Peas, spinach, and other vegetables having a green color, keep their color best if cooked uncovered.

The name "greens" is commonly applied to the leaves of certain plants used as food. Among the best-known of these stand spinach, mustard, cress, dandelion and dock. There are quite a number of others, both cultivated and

wild. Most of them rank among our cheapest articles of food, as they may often be secured by the roadside, with no outlay except that of time.

The custom of serving these with fat meats is sensible. As most greens contain considerable cellulose, they should always be cooked until quite tender, and then be chopped very fine, or pressed through a sieve. It is well to dress them with vinegar, as this softens the cellulose.

Certain of the watery vegetables may be stored for future use. Turnips, carrots and parsnips keep fairly well if merely placed in shallow bins, free from dampness. When tomatoes grow in a temperate climate, the entire plant may be taken up before the frost touches it, and stored in a dark cool place. Any well developed green tomatoes will gradually ripen. Tomatoes are very satisfactory for canning, as they retain their color and flavor better than most vegetables kept in this manner. Corn, peas and beans have proved difficult to can successfully at home. It is believed that the proteid matter they contain forms the source of the trouble. Very young string beans, however, in which the seed has scarcely formed, may be canned with success. For home use, the old and well-known methods of salting or drying are the easiest and safest for corn, peas and beans.

Readings: Food Products of the World (Greene), chap. XXIII; Foods (Smith), pp. 204-213; Home Vegetable Garden, Farmers' Bulletin No. 255; Preparation of Vegetables for the Table, Farmers' Bulletin No. 256.

FRUIT.

Chemical Composition.

Typical Example:—Apples.

Water 83.50, sugar 7., pectin 6.80, cellulose 1.50, acid .80, proteid .36, mineral matter .05.

Fruit is commonly defined as that part of a plant which contains the seed. Thus, nuts, grains and quite a number of vegetables are really fruits. But in general, by the word fruit we mean sweet articles of this class, or those dressed with sugar and used as a dessert.

The nutritious principle in fruits is sugar, although in most fruits this does not occur in large amount. Among

those richest in sugar are figs, dates and raisins. These, because of their heating property, prove best adapted to the winter's diet.

The beneficial effects of fruit upon the human system are similar to those of the watery vegetables, but fruits in general yield less mineral matter than do vegetables, and more acid. On account of the various acids and the large percentage of water in fruits, they are cooling and refreshing to the system. Hence, fruits and fruit drinks prove very acceptable during summer; and in most cases of disease where there is a feverish state.

It appears that the most wholesome fruits are those in which some one acid exists in large amount. Apples, containing malic acid, stand first in the list. Grapes, with tartaric acid, and oranges, with citric acid, rank about equal in their good effects on the system.

Almost all fruits with soft pulp, as apricots, peaches, pears, plums, etc., are thought to be fairly wholesome.

Those having many seeds, as blackberries, raspberries and huckleberries, are sometimes harmful. They prove less objectionable if eaten with bread or other bulky, strachy food. It is wise not to indulge in them freely in any case.

The compact fruits, raisins, bananas, etc., should be eaten only in small amounts, and with some kind of bulky food.

Green fruit and ripe fruit differ from each other in many respects. Besides the change in color which generally takes place during ripening, the fruit becomes less acid, most of the starch is turned into sugar, and the jellying principle, called pectin, is formed.

Fruits begin to ferment, or "spoil," soon after the perfectly ripe stage. They then become poor in flavor, and of a very soft texture. So, fruits for canning or preserving should be slightly under-ripe. This is necessary, also, in jelly making, as the pectin loses its stiffening power when the fruit becomes over-ripe.

For using raw, perfectly ripe fruit is the best from the viewpoints of both flavor and wholesomeness. Ill effects often follow the eating of green fruit, or of fruit so ripe that decay is beginning. In case either green or over-ripe fruit must be used, it should be served in some

cooked form, as thorough heating seems to prevent harmful effects. Some fruits (as grapes, gooseberries, currants and plums) in their green state are much prized for pies, jellies and certain other dishes.

As a rule, fruit is cheapest and also finest in flavor during its natural season. Strawberries in mid-winter and peaches in early spring are scarcely desirable except as curiosities. Most fruit is at its best in flavor when allowed to ripen on the plant—the main exception being certain kinds of pears.

In case one can not use berries or other soft pulpy fruit at once, it keeps best if spread out in single layers. This rule may well be applied also to the firmer fruits, as apples and pears. Not only is decay less likely to spread, but any of the fruit that shows signs of spoiling may be readily seen, and used before it becomes worthless.

Strawberries, and similar fruits may be washed by putting them into a colander, which is then dipped several times into a deep pan of water. By this method, the fruit does not become crushed so easily as when put directly into the water. The skins of bananas, oranges and other fruits, that have received much handling or have been shipped long distances, should be well wiped with a damp cloth. In case a polish is desired on apples, they may be rubbed briskly with a dry cloth. Grapes should always have careful rinsing. Especial care needs to be taken with malagas or others that come packed in ground cork or sawdust.

After their skin is removed, most fruits quickly turn dark on exposure to the air. Hence, as a rule, they should not be pared until needed. If this work must be done beforehand, it is well to drop the fruit as finished into cold water containing a little lemon juice. This prevents, to some extent, the discoloration.

When slicing bananas, if they are cut slanting, instead of straight across, the slices will be larger and more attractive. (This is the meat dealer's way of slicing the tip end of beef's tongue.)

Oranges, if sliced parallel to the core—up and down—instead of crosswise, are much more easily managed at table. The crosswise slices, however, look prettier.

The custom of using sugar and cream with fresh fruits is not hygienic. Sugar disguises the delicate flavor of the fruit, and lessens its tonic and cooling effects upon the system. Cream acts similarly and may form a tough, indigestible curd when mixed with the fruit acid.

In the absence of fresh fruit, dried or evaporated fruit is a useful substitute. By dried fruit we usually mean that which is cured at home either by the heat of the sun or of a moderately warm oven. This process, being slow, allows the fruit to become dark, and usually dusty. Home-dried fruit is thought by many to have a richer flavor than the evaporated.

The term evaporated fruit is generally applied to that cured in large amounts for commercial purposes. The plan consists in quickly driving out much of the moisture by hot air, or by placing the fruit on trays heated by steam. Such fruit usually makes a good appearance, being of a lighter color than home-dried fruit. The pleasing color may result from the quick drying, but is sometimes produced by bleaching the fruit in the fumes of sulphur. It is believed that this process makes the fruit less wholesome. The dry air and hot sun in California cure fruit so rapidly that, although dried, it takes the name evaporated.

Both in its fresh state and in its various forms of preservation, fruit is, at the present time, of much commercial importance. The industry has grown very rapidly. Before the latter half of the nineteenth century, the only fresh fruits obtainable throughout the year were apples, oranges and lemons, and the only dried fruits, prunes, figs and raisins. At that time, fresh fruit could not be kept in good condition for more than three or four days, as cold storage had not become known, nor was it possible to ship fresh fruit successfully for any long distance, because refrigerator cars had not been invented. Besides, both land and water transportation were slow.

Now, perishable fruits from Texas may reach the Chicago markets in three or four days, while those from Florida points arrive at New York in an equally short time. The ease and rapidity of shipping have stimulated the culture of certain fruits in those regions best suited to their growth. Thus, New York State grapes may be bought

during many months in almost every part of the Union; California sends oranges, lemons, cherries and apricots as far as the Eastern sea-board; Georgia and Delaware peaches meet with enormous sales in far remote states; Michigan has become the central shipping point for Bartlett pears, while Missouri apples have long been widely known. Although the area of cultivation for most fruits is extending rapidly, that for apples has become so large that North America stands as the great apple growing region of the world. Not only does this fruit find a ready sale in our own country, but large quantities are sold to other nations.

So important has the fruit trade become that the United States government employs experts to visit our great fruit districts and suggest the best means of picking, packing and shipping raw fruit. By careful treatment, fruit is now usually in good condition when it reaches the consumer. There thus occurs in two ways a saving above old-time methods: the retail cost is lower, and the cultivator suffers less loss from fruit spoiled during shipment. Americans use, besides the home-grown fruits, enormous quantities from the tropics. Each week, from twenty to thirty thousand bunches of bananas reach New York City alone; while pineapples (rare and very expensive fruit abroad) are commonly seen here even in small towns, and at a reasonable price.

In addition, the national government sends agricultural explorers to foreign countries for the purpose of discovering fruits and vegetables unknown in our land. Many of these when brought here, thrive well. Thus, our menu is made more pleasing, varied, wholesome or economical. Some of the comparatively new foods are the Japanese persimmon, the Chinese leitchee nut, the bur artichoke, the avocado and the chayote.

Aside from its commercial value in the raw state, fruit forms the basis of very many manufactured products. Apples are made into marmalade, butter, jelly, evaporated, cider, brandy; grapes form jelly, vinegar, wine and argols (from which cream of tartar is obtained); cherries are canned, preserved, candied and dried. Most other fruits may be used in similar ways. Certain ones, the orange and

lemon in particular, afford material for flavoring extracts; while orange blossoms and those of some other fruits are used in perfumery. Citric acid, from the lime and lemon prove of value to calico printers.

Readings: Triumphs and Wonders of the 19th Century (James P. Boyd), pp. 471-490, on "The Century's Progress in Fruit Culture;" Outing, Vol. 53, p. 497-501, on Oranges; Food Products of the World (Greene), pp. 217-233; The Home Fruit Garden, Farmers' Bulletin No. 154; Use of Fruits as Food, Farmers' Bulletin No. 293.

NUTS.

Chemical Composition.

Typical Example: Walnut.

Fat 63.4, proteid 16.6, carbohydrates 16.1, water 2.5, ash 1.4.

The term nut, as commonly used, means a seed or kernel, enclosed in a more or less woody covering or shell.

Nuts are produced by many groups which differ much in manner of growth. For example, the cocoanut grows on a tropical palm, the American hazelnut on a bush, and the familiar peanut (strictly speaking, not a nut) on a vine-like plant.

It is only natural that primitive peoples, knowing little about methods of cooking, and subsisting largely upon raw foods, should utilize nuts as staple articles of diet. The acorn, seldom used in our day, save by the peasants of the Mediterranean region, and by certain Indian tribes of the Western United States, was much esteemed by the early Greeks and French.

Both among our North American Indians, and several foreign peoples, nuts from the cones of pine trees have long been in use. One variety, commonly called the pignolia, is becoming, by reason of its delicate, pleasing flavor, a popular addition to the cakes and candies put out by our present-day confectioners.

While the list of nuts in general use as food is constantly growing larger, those of the greatest commercial importance are still the old-time favorites, cocoanuts, almonds, Persian or English walnuts, chestnuts, pecans, hazelnuts and peanuts.

The cocoanut, in its ripe stage, differs from its green form. In the latter the pulp is a soft, gelatinous mass, of pleasing flavor, and readily digested. Not only the natives of the tropics, but also travelers in those regions, consider the meat of the unripe cocoanut a great delicacy. In the ripe nut the firm, thick layer of flesh proves very indigestible. (Children should not be allowed to eat it.)

The cocoanut is shipped both ripe and in a dried state. Before drying some of the oil is often removed, and the remaining mass forms the basis of the familiar "prepared" or "desiccated" cocoanut. The oil extracted from the nut is much liked in the tropics for cooking purposes. In the manufacture of marine" or "salt water" soap, cocoanut oil proves useful, as it makes a lather with hard water.

Probably no other tree has so many uses as the cocoa palm. To the natives of Ceylon it provides food, clothing and shelter. From the outer husks of the nuts are made ropes, mats and garments; while the hard shells, often beautifully polished, carved or inlaid, form cups and bowls. The trunks of trees, large and small, supply posts and water pipes; the well-developed leaves provide thatching; and even the cluster of young leaves (called palm cabbage) at the top of the tree is much prized for food, trees sometimes being cut down for the sake of it.

Almonds are the seeds of a fruit related to, and closely resembling, the peach. The pulp of the almond, however, is not fit for food. In the Hebrew, the word almond means "wakeful"—a reference to its very early blossoming.

Almonds occur in many varieties, certain ones having a thick, somewhat hard shell, while others, called "paper-shell" have an envelope so thin that it may easily be crushed under one's fingers. Again, some kinds contain a short, thick kernel, while that of the highly-prized Jordan almond is long and slender. Almonds are known, also, as sweet and bitter, the former being the kind in general use for food. As bitter almonds have a very high flavor, confectioners sometimes add a small amount to preparations of the milder sweet almonds. But the use of bitter almonds must be with great care, as they contain a poisonous acid. In the household, when flavoring cakes, etc., with almond

extract only a few drops should be used. Severe attacks of illness have followed the eating of foods highly flavored with almond.

Sweet almonds (which contain very little of the objectionable principle found in bitter almonds) appear to agree with most persons better than any other nut. It is wise, however, to remove from the kernel its tough brown skin. This process, called blanching (whitening) consists in placing the shelled nuts, for a few moments, in boiling water, and then rubbing off the loosened skins. The almonds should then be put into a moderately warm oven until thoroughly dried and crisp. Eaten thus, they are probably in a more wholesome form than that called "salted almonds." In the process of preparing the salted nuts, they are usually browned by contact with hot fat, which may prove irritating to the digestive organs.

From very early times chestnuts have been favorably known as food. They were introduced into Europe from Asia Minor.

Chestnuts native to the United States, although superior in flavor, are inferior in size, to those of Europe and Japan. For the purpose of raising large nuts, which command a high price, chestnut growers in this country often graft native stock with Italian or Japanese varieties, the latter usually proving the more hardy.

In comparison with most other nuts, chestnuts contain a much larger amount of starch, but less fat and proteid. They may be said to form nearly a perfect food. In Italy, during a considerable part of the year, the peasantry live, and appear to thrive, on a diet of little else than chestnuts. Sometimes a trifle of cheese or fish is added to supply a slight lack of proteid and fat.

Chestnuts should not be used as food unless thoroughly cooked, in order to make their starch digestible. When roasted, their flavor is probably at its best; but, when boiled, they may form a part of a greater variety of dishes.

The peanut, like the chestnut, contains much starch, and should not be eaten unless cooked. It is usually parched or roasted. Boiling renders it unpalatable. For

this reason, the experiment, made in the German army, of using peanut soup—a cheap, and nutritious ration—was unsatisfactory.

Peanut oil, of a somewhat nutty flavor, and bland character, proves not greatly inferior to olive oil. For the production of oil, manufacturers generally prefer the African peanut, this variety being very rich in fatty material. By reason of its low cost, peanut oil is often used as an adulterant or substitute for olive oil.

There are many manufactured preparations from nuts. Among these, almond paste, a mixture of ground almonds and sugar, has ready sale among confectioners for the making of macaroons, etc. Peanut butter, which is comparatively low-priced, and useful for sandwiches and many other dishes, has proved of especial value in the diet of children who are anaemic or who dislike milk. Preserved chestnuts ("marrons glaces") are a preparation of chestnuts preserved in sugar syrup flavored with vanilla. They form a dainty, pleasing, but expensive addition to the menu. A somewhat similar article made from walnuts and maple syrup has become popular as a sauce for ice cream.

It is customary to use nuts merely as adjuncts to other foods. But considering their high food value—the almond for example, containing 21 per cent of proteid, 54 per cent of fat, and 13 per cent of sugar—they may with reason take the place in the diet of eggs, meat or other proteid.

On account of their extreme concentration nuts should be combined or served with foods having considerable bulk, for instance such vegetables and fruits as potatoes, tomatoes, asparagus, celery, apples, peaches, grapes, pears, figs or dates.

Also, because of their compact form, nuts should be eaten very slowly, in order that the particles may become finely divided. Thus, they prove less of a tax upon the digestive organs.

Comparing the cost of nuts and meat as sources of proteid and fat, it is found that ten cents spent for peanuts will buy four times as much proteid and six times as much fat as will the same sum if invested in porterhouse steak. Other nuts, however, whose cost is higher, are little, if any, less expensive than meat.

With regard to the relative cost of whole and of shelled nuts, one may generally obtain from the shelled article a greater amount of edible material for the money expended. The reason for this is probably the less weight and bulk of shelled nuts, and the consequent lower freight rates and other transportation expenses.

Reading: Nuts as food. Farmers' Bulletin No. 332.

BEVERAGES.

Our word beverage comes from bever, which formerly meant any light food or drink taken between meals. As the liquid refreshment was usually the main part, the term beverage finally came to mean anything to drink.

It seems odd that every nation in the world has one or more beverages in general use. In most countries, some common and cheap product has been made to yield the desired liquid or flavoring matter. For example: the Mexicans obtain their national drink, pulque, from a species of "century plant;" the people of Central Africa make a wine from the sap of the palm tree; the Arabians convert milk into kumiss; while the Chinese make sake from rice. It is a well-known fact that most of the cereals, especally barley, corn and rye, are used in similar ways, and also nearly all fruits, grapes and apples in particular. While, unfortunately, many of the beverages from these sources are intoxicating, we can find several free from this objectionable feature. Of these, tea, coffee and cocoa are the ones in most common use on American tables.

Cocoa or chocolate is in itself a true food, but when used as a beverage it can give no very large amount of nourishment, as it is in such a dilute form. Tea and coffee are not foods but stimulants, thus they cause a person to feel better for the time being. Also, they prevent waste of tissue. For these reasons they are sometimes of considerable value. Perhaps their main danger lies in the fact that people occasionally depend upon them to take the place of true foods. The custom—followed by some students—of studying until late at night, and keeping awake by drinking strong coffee, is sure to prove harmful.

While persons in good health do not positively need stimulants of any kind, these beverages, if properly made, and used in moderation, seldom produce ill effects. It

seems best not to use any one of them exclusively. Tea and coffee are believed to counteract each other in their effects on the human body. So, it is well to serve them only at alternate meals. Both tea and coffee, because of their action on the nervous system, are unsuitable for the young. Cocoa or chocolate, being less stimulating, and having the power to build up tissue, is seldom objectionable.

Reading: Home Life in All Lands (Morris), pp. 41-49.

TEA.

Chemical Composition.

Active ingredients: Theine 2 to 4 per cent, tannic acid 10 to 12 per cent, volatile oil 1-2 to 1 per cent.

Tea—a plant grown for its leaves—is thought to have been native to China. In that country its cultivation has extended over thousands of years. It is now grown also in Japan, Korea, Ceylon and India. Experiments have been made in raising it in South Carolina.

In the jungles, the tree grows to a height of 30 ft. or more, with leaves frequently nine inches long, and four inches wide. Under cultivation, for protection against winds, and for convenience in picking the leaves, the plant is generally kept down to a height of two or three feet.

Each year there are three pickings. The leaves gathered at the first picking, in April, bring the best prices, as the young leaf-buds make a beverage of finer flavor than do the large, well-grown leaves of later crops. (From a really fine grade of tea it is impossible to brew a dark beverage. Many persons do not understand this, thinking that a light colored tea is poor or weak.) The last picking is very inferior, and the leaves are sold almost entirely to the poor people.

It is a rather curious fact that the fresh leaves have neither odor nor flavor. After picking, they are cured by various processes, and made into either green or black tea. These two kinds of leaves need not grow on different plants. Their color depends upon the method of drying. Black tea is dried slowly—often by the heat of the sun—and allowed to ferment. Thus it grows dark (just as a heap of autumn leaves do, when exposed to moisture and

heat). For green tea, the leaves are dried quickly, by artificial heat, and so keep much of their natural color.

The rolling of tea leaves is done by hand, or even by the naked feet or by machinery.

After curing, tea leaves quickly lose flavor unless kept dry. For this reason, in olden times, the finer grades of tea were never sent to other countries by a water voyage. Instead, the fine teas were taken overland, on the backs of camels, by the "Caravan route." Even now, with fast sailing vessels built especially for the tea trade, the captains each wish to be first in reaching port with his cargo of tea. Packers of tea are always careful to line tea chests with tin foil as a means of keeping out moisture. Taking a lesson from such broad experience, the housekeeper should never let tea remain in a paper sack, but should store it in a tin canister, glass jar or other air-tight vessel.

The flavor and stimulating effects of tea are due mainly to theine, tannin, and a volatile oil. Tannin is that which gives the bitter flavor. One notices this especially when tea has been steeped too long, or actually boiled. Tannin obtained from oak bark, etc., is used in tanning leather. The tannin in tea has a like effect in stiffening animal tissues, and may even act on the lining of the stomach. Consequently, tea should be made in such a way that but little tannin is drawn out of the leaves.

Tea owes its stimulating effect, for the most part, to theine. Water below boiling point does not dissolve enough theine to make a pleasant beverage. Nor will a shorter time than three minutes answer for the theine. But if tea steeps longer than seven minutes, it grows bitter from too much tannin. For the best results then, the medium time of five minutes is chosen.

Green tea, on account of the quick curing given the leaves, is more stimulating and has a more decided flavor than black tea. Also, green tea contains about twice as much tannin as black tea.

In order that the beverage made from green tea be not too strong and bitter, the water poured on the leaves should be slightly below boiling point. For black tea, the water should be brought to a boil immediately before pouring it over the leaves. To secure good results, fresh cold

water heated quickly, is necessary. The Chinese think water from a running stream the best. Such water naturally holds much dissolved air, hence has a pleasing flavor. Soft water should always be used in preference to hard. Of the two, hard water can dissolve less of the flavoring matters of the tea; also, any mineral substance in the water may injure the flavor of the beverage.

Tea should always be made in a china or a well-glazed earthenware pot. If made in a tin pot, the tannic acid acts on the metal, making a beverage dark in color and displeasing in flavor.

It is unhygienic to add cream or milk to tea, as the tannin changes the casein of milk into a tough curd. There seems to be no harm to the health in using with tea either sugar or lemon, sliced, after the Russian fashion.

Readings: Foods (Smith), pp. 330-359; Home Life in Colonial Days (Earle), pp. 164-165.

COFFEE.

Chemical Composition:—Roasted.

Active Principles: Oil 13.59, tannin 4.74, caffeine 0.82.

Coffee grows in tropical countries, such as Arabia, Java, the West Indies and South America. Brazil raises enormous amounts, and ships to the United States about three-fourths of all the coffee used here.

It is related that from Arabia came the first coffee shrubs grown in Europe. These were planted in conservatories and carefully studied by French and Dutch scientists. The latter quickly saw the economic value of the plant and coffee culture was soon begun in the Dutch East Indian possessions. Wonderful crops were produced, and thus was laid the foundation for much of Holland's commercial prosperity.

Coffee is thought to have come to the West Indies by way of France. From there, a naval officer, having a plant in his care, set sail, and after a long and stormy voyage, in which he shared his scanty supply of drinking water with the plant, he finally reached the islands. From the tree thus introduced have sprung the huge West Indian coffee plantations of the present time.

The coffee tree grows about 8 to 18 ft. high, when wild. In cultivation it is kept down to an average of 6 ft., the pruning being for convenience in gathering the crop. The part used is the seed of the fruit, which when ripe resembles a red cherry. Occasionally, the fruit contains only one seed. Any such are much valued and sell at a high price, under the name of peaberry or male berry. (However, the term berry for coffee is incorrect. The word bean, which is sometimes used, comes from bunn, the Arabic name for coffee.) As a rule, each fruit holds two seeds, covered with a membrane called parchment. The tree bears during eight months of the year, presenting a beautiful appearance, as it holds at the same time white blossoms and green and red fruit clinging thickly to the branches.

After being picked from the tree, the seeds must have their outer covering removed, then they are sorted, according to sizes. This is necessary because in a later process, that of roasting, if mixed, small beans might burn before those of large size were sufficiently heated. Roasting is done for the purpose of developing flavor. Before roasting, coffee may be of a dull greenish color, as that from of roasting, coffee turns some shade of brown. There are Brazil and the West Indies, or a pale yellow, such as that from Java and other East Indian countries. In the process three degrees, called red, chestnut, and dark roast. The red, or pale brown, does not bring out enough flavor to suit most tastes. The dark roast produces a strong, somewhat bitter flavor. This kind is preferred abroad, and by many among our foreign population. Most Americans like the chestnut, or medium roast.

During the roasting, the seeds gain in bulk, from expansion of gas, but they lose in weight because of the moisture driven out. To make up to themselves for this loss in weight, some coffee roasters turn over the coffee a jet of steam. By absorbing this moisture, the coffee takes, among dealers, the name of "wet roast." The better grades of coffee are not thus treated, and they appear in advertisements as "dry roast."

Coffee in the green stage improves with age. Government Java was formerly kept in warehouses for seven years, and became noted for its fine flavor. After roasting, however, the sooner coffee is used, the better. In countries where it grows, most households have the daily supply fresh roasted. Since the flavor escapes easily, it should be kept in air-tight cans.

It is well to buy unground coffee, and to grind it only as needed. Coffee in the whole grain is generally the pure article. Ready-ground coffee may be much adulterated. Chicory, a plant belonging to the same order as the dandelion, is one of the main adulterants. The root, roasted and ground, is the part used. The French and certain other nations prefer the addition of chicory, as it gives a somewhat bitter flavor to the coffee, and deepens the color. Caramel, also, is sometimes added for coloring.

Coffee itself has a slightly bitter flavor, due to tannin, of which coffee contains less than tea. The stimulating property of coffee is given by its caffeine (similar to theine in tea), while its flavor and aroma are due to a volatile oil. There is a greater amount of such oil in coffee than in tea, hence the more noticeable odor of coffee.

As a beverage, coffee may be made either by boiling or by filtering. For the latter method, the coffee, ground to a fine powder, is put into a French, Vienna or drip coffee pot. There are many varieties of these, the main point in all being that the coffee does not rest directly in the water. Whether the coffee be held in a cheesecloth sack or in a perforated cylinder, the boiling water is slowly poured over it. This method develops the flavor and aroma, but draws out very little of the objectionable tannin.

In making boiled coffee, the bean must be ground only moderately fine, else the beverage will be "muddy." White of egg is generally added because heat coagulates the albumen of the egg. As this is mixed through the beverage, and gradully stiffens, it gathers up floating bits of coffee or impurities, and thus clears the liquid. Boiled coffee, as the name implies, is really boiled in water. If the boiling be continued for longer than one or two minutes, the fine aroma of the coffee passes off into the air and cannot then be in the beverage. The old method of boiling

coffee from ten minutes to an hour in order to draw out the "strength," did extract the tannin, and made the coffee both black and bitter, but the pleasing frangrance of the coffee was lost. For those who prefer boiled coffee, perhaps the best way to make it is to put the coffee on the fire in cold water and bring quickly to boiling point, when it should be used at once. Most persons know the fine flavor of coffee made in this way over a wood fire in the open air.

While opinions differ regarding the flavor produced by the various ways of making, infused coffee must be granted preference from the standpoint of economy. For this method the bean needs to be ground fine, so a less quantity may be used than when ground coarse as for boiled coffee. When ground at the grocery, the coffee is seldom as fine as the economical housekeeper wishes. The grocer may prefer to grind coarse because less time and less strength are needed than in pulverizing the bean. Also, his profits are greater on the coarsely ground article, because much of this has to be used in order to color and flavor the beverage.

In buying coffee, it is seldom of use to pay any attention to the special name given. This may have little or no meaning. Coffee put up in cans is generally called Mocha and Java; although it has perhaps been raised thousands of miles from either place. As a rule, the small grains go by the name of Mocha, while larger flat grains are called Java.

There are a number of coffee substitutes, the most of them being made from roasted grains—rye in particular. These cereal beverages can not be thought unwholesome unless some foreign stimulant has been added. Their natural lack of stimulating effect is the most important point claimed in their favor.

Reading: Coffee from Plantation to Cup (Thurber).

COCOA.

Chemical Composition.

Main ingredients: Fat 49.9, proteid 10.9, carbohydrates 2.4, theobromine 1 to 2.

The word cocoa is properly cacao. It seems a pity not to use the correct term, as many persons confuse cocoa with cocoanut, although the two are entirely different.

Cocoa (or cacao) is obtained from a tree which grows wild in South America and Mexico. The earliest accounts of the chocolate plant have come to us through the explorers who followed Columbus to our continent. These men took a great fancy to the drink in use among the tribes living about the Caribbean Sea. Directions and material for making the beverage were carried back to Portugal and Spain, and in a short time, chocolate became popular throughout Europe. The cocoa tree bears seed pods about ten inches in length. Each pod contains from twenty to thirty seeds, which in size and shape are much like almonds. When the pods ripen they are cut from the tree by the use of a long pole, to the end of which a knife is fastened. This means is necessary, as the tree grows to a considerable height. The pods, after removal are usually gathered into heaps, or stored in a hole in the ground, to "sweat." This process softens the pulp around the seeds, and they are then shelled out by hand, about as we shell peas. Afterward, they pass through several processes, the main one perhaps being the roasting, which has much to do with developing their flavor. Most Americans prefer cocoa or chocolate made from beans that have been roasted only enough to color them a rich brown. For use among many other nations, the seeds are roasted until nearly black.

After the roasting, there is taken from each seed its outer husk or thick skin. These are sold as cocoa shells and may be used to make a beverage which is thin, like tea, but has the flavor of cocoa. It is often useful for delicate children or invalids. The shells can be bought in large cities, and are low in price.

The seeds are next broken into coarse pieces, called cocoa nibs. These, also, sometimes prove of value as a beverage for invalids. In order to draw out the flavor of the nibs, they must be boiled much longer than either cocoa or chocolate. If thoroughly dried after each cooking, they may be used several times before losing flavor.

For the manufacture of chocolate, the nibs are crushed under heavy heated rollers, until they form a thick paste. This, when run into molds, and hardened in a cool place, takes the name of chocolate.

When most of the fat is removed from the chocolate, and the remainder dried and ground to a powder, it becomes known as cocoa.

The fat, called cocoa butter, is used in certain kinds of candy. It has, also, considerable value as a salve for chafed skin. To some extent, it is used in the manufacture of soap, and as a source of glycerine.

During the process of manufacture of cocoa or chocolate, there are several common additions. If sugar be put in, the product is called sweet chocolate. As a matter of economy unsweetened or "bitter" chocolate, should be given the preference for general cooking purposes. Bitter chocolate and sweet chocolate usually sell for the same price, about forty cents the pound. Thus, in the case of the sweetened article, one pays at the rate of forty cents per pound for whatever sugar it contains.

Vanilla or cinnamon are sometimes added to chocolate or cocoa. These flavorings improve the product for some tastes, and can scarcely be looked upon as adulterants.

Some of the inferior grades of cocoa and chocolate are adulterated with starch, ground cocoa shells, or other cheap substances to increase the weight. If there is a rather coarse sediment found in a cup of chocolate, one may suspect the presence of cocoa shells. When the beverage thickens decidedly upon boiling, it is fairly certain that starch has been added.

In making a beverage from cocoa or chocolate, one should always observe the rule of boiling it in water. The milk or cream desired may be heated and added just before serving. The delicate flavor of cocoa and chocolate is ruined by the usual method of boiling in milk; also, when made in this way, the beverage is less digestible.

Since chocolate contains much fat, it is heating to the system, and is well suited for use in winter. Cocoa, having little fat, is found better as a part of the summer diet.

Reading: The Chocolate Plant. (Published by Walter Baker and Co.)

PROTEIDS.

As proteids are the only class of substances fitted for building up animal tissue, they are the most important of all our foods. They can also, furnish heat and energy. Thus, we may rely on them, if necessary, to take the place of starch, sugar and fat. But as carbohydrates are cheaper foods, it is a point of economy to use them for supplying heat, and to depend on the proteid only for the building up of muscle and other tissues.

Proteid foods are obtained from both animal and vegetable sources. Among the animal proteids are milk, cheese, eggs, shellfish, meat, poultry and game. Vegetable proteid is found mainly in dried peas and beans, peanuts, chocolate and bananas. It also occurs in the cereals.

Animal proteid proves to be more easily digested than vegetable proteid. Some give as the reason for this, that animal proteid is more like the tissues of the human body. Nearly all of the animal proteid is absorbed, while only about two-thirds of the vegetable proteid can be used. Thus, one must eat a greater bulk of proteid from vegetable than from animal sources in order to gain an equal amount of strength.

VEGETABLE PROTEID.

Chemical Composition.

Typical Example:—Beans, dried.

Carbohydrates 55.8, proteid 23., water 11.7, cellulose 4., mineral matter 3.2, fat 2.3.

In this country, the vegetables in most common use for supplying proteid are dried beans and peas. While there are many varieties of these, special ones are favored in certain localities. Thus, in Oklahoma and other parts of the Southwest, the small "chile" bean, and the larger kidney bean are much esteemed. The taste for these was evidently introduced from Mexico. In the Southeastern States, the black-eyed bean and the cow-pea are greatly used. New England—long noted for its baked beans—favors the navy or pea bean.

The lentil, scarcely known in the United States, except among our foreign population, is used extensively in Canada and European countries.

In appearance, lentils (the seeds) resemble small, flattened peas. The color of the common varieties is pink, brown or green. It is said that the mess of pottage for which Esau sold his birthright was made from lentils.

Dried beans and peas must always be cooked in soft (unsalted) water. Salt, or other mineral matter, acts on the casein, hardening it so that the vegetable will not cook tender. (The Chinese take advantage of this fact in making a kind of cheese from the soy bean.) Seasoning should be added to dried peas or beans only a short time before serving.

These foods require long, slow cooking, to make the starch digestible, and also to soften the cellulose which is much hardened in drying.

As the envelope or skin on peas and beans is very tough and indigestible, it should be removed whenever possible. (What are sold as split peas have had the skin taken off by a chemical process.) In making soup from any of these vegetables, it is wise to pass them through a sieve after cookin, so that the skins need not be eaten.

Since all foods of this class are somewhat lacking in fat, this should be added in the course of cooking. Thus, beef suet is used in preparing "chile," and fat pork with Boston baked beans.

(Fresh green peas, and also string beans, when young and tender, are reasonably classed among watery vegetables, because very little proteid has developed. Both of these, when quite young and fresh, are thought easy of digestion.)

Peanuts belong to the same botanical family as peas and beans and contain about an equal amount of nutriment. But they have not been recognized as a staple food. Nevertheless, there is quite a large trade in peanuts. They are much used in the manufacture of candy and cakes; also, as a "pick-me-up" between meals. While they disagree with some, their food value is high, and they form a cheap source of proteid. They need thorough roasting in order to cook the starch. If eaten with a bit of salt or in the form of salted peanuts, they seldom cause distress. Being a compact food, they should always be well masticated.

Bananas are cheap and nutritious, but contain only four per cent of proteid—not enough to sustain life unless very large quantities are consumed. In the tropics, where the poorer people have scarcely any other food, each person eats five or six dozen bananas daily.

Chocolate may be added to a diet lacking in proteid in the form of chocolate drops (best used at the end of a meal) or as an ingredient of puddings, cakes, ice cream, etc.

ANIMAL PROTEID.

MILK.

Chemical Composition.

Water 87., sugar 5., fat 4., proteid 2.2, mineral matter 0.7.

Milk is often called a perfect food, but for adults it does not contain enough carbohydrates. If used with bread or potatoes, it forms a fairly nutritious food for those doinly only light work. The main objection to milk as a food for persons taking active exercise is its large per centage of water. Thus, at least four or five quarts would need to be drunk daily in order to furnish enough nutriment. Hence, as generally used, milk is not depended upon entirely for proteid supply. Its value as an article of diet appears chiefly in the following ways: As an addition to foods somewhat lacking in proteid, for example, a milk sauce with vegetables; as a means of diluting very concentrated proteid, like eggs, in the making of custard; as a sole source of proteid in cases of illness when little nourishment is needed, or when heavy proteids would not agree.

It should always be remembered that milk is a food—not merely a drink. Although it is taken into the system as a liquid, during the process of digestion, it soon becomes a solid. Hence, like any other solid food, it should be taken in small portions at a time. (One physician says that milk should be "chewed.") In this way, during the process of digestion, only small clots are formed, and the system can easily assimilate these. But if milk is drunk at a gulp, a large tough clot forms which greatly taxes the digestive organs.

"Germs" of various kinds grow readily in milk. For example: one kind colors it blue or red; another causes

souring; while still others give it an unpleasant flavor. Milk has often been found a carrier of typhoid, tuberculosis, etc. For this reason, the greatest care should be taken in handling milk. When it must be bought from dealers, sealed jars, though not above suspicion, are more sanitary than the old-time huge metal can, left open to the air each time a customer was served.

Whether one cow, or a herd, be kept, strict attention should be given to the cleanliness of stables, animals, hands and clothing of the milkers, utensils and water used in washing the utensils. Covered milking vessels are superior to the open pail. The milk should be passed through a fine strainer, and then cooled as soon as possible. A spring house is perhaps the ideal place for storing it, especially when there are large quantities. If in small amount it may be kept in a refrigerator, cool cellar, or cool pantry. In no instance should it be put near anything having a decided odor, as turnips or cabbage, because milk absorbs odors very readily. The places for storing milk should always have good ventilation, but be free from dust. To keep out dust, there may be a thin cloth or loosely fitting cover over the milk. With a tight cover, the flavor of the milk is not so good.

The best utensils for holding milk are glass or porcelain, because these are easily cleaned, do not absorb odor or flavor, and have no seams to form lodging places for bacteria. Bright tin, well coated—preferably block tin—may form the second choice. Wooden utensils should always be avoided.

Utensils require careful washing in luke-warm water to which plenty of soda has been added. Clear, hot water should be used for rinsing. It is best to dry the utensils in the direct sunlight, this being a great purifier. If tin utensils must be used, much care should be taken in cleansing the seams. For this purpose, a skewer, with a thin cloth wrapped about the end, answers fairly well.

After milk has been kept for awhile, certain changes occur in it. These may be a souring and thickening due to the formation of lactic acid; or, there may be putre-

factive changes, known by unpleasant odor and flavor. Both of these changes occur much less quickly in clean than in unclean milk.

As a means of keeping milk sweet, scalding or heating to about 140° to 150° F. is useful. This method is also called pasteurization, because the noted chemist Pasteur recommended it. The milk should be put into a double boiler and heated for about a half-hour, or until bubbles appear around the edge. Then it is to be taken off the fire and cooled quickly. At scalding point, most "germs" that may be present are destroyed. Yet the milk is not made less digestible nor is its flavor changed. Some persons make the mistake of boiling the milk. If heated to so high a degree, it becomes much less digestible by the toughening of the casein. Also, the fat separates out, appearing as greasy globules on top, and the flavor of the milk is changed. For these reasons physicians seldom recommend that milk be boiled, unless there is an epidemic of some serious disease that may be carried by the milk. However, the lower heat of scalding is always wise when milk needs to form almost the sole food of invalids or children. Such heating proves of especial value during hot weather. Many physicians say that milk should be scalded even for those in good health. The scum which appears on well-heated milk should not be thrown away, as it consists of fat, casein and albumen. If its appearance is displeasing, a brief beating will break up the particles.

When milk seems to be on the point of souring, the addition of a trifle of baking soda is not thought to injure the health. But one should never risk the use of salicylic acid, formaldehyde or other such preservatives.

It is now believed by many that buttermilk or clabber ranks above sweet milk in wholesomeness for adults. After souring or churning, the milk does not form in large clots when taken into the system. For this reason, the digestive juices can readily act on it. Also, the acid in the milk appears to aid digestion. In fevers, buttermilk is often of value, on account of the cooling effect of the acid. Likewise, it may well be used, especially during summer, by those in good health. The lactic acid bacteria hinder the growth of other bacteria which are injurious to the human

system. It is now claimed by some that the long life of the peasants in certain European districts is due to their daily use of buttermilk or clabber. Possibly there may be much truth in the old saying of the East Indian shepherds that "a man may live without bread, but without buttermilk he dies."

As the fat of milk—cream—is liked by nearly every one, and has many uses in cookery, it always brings a high price in comparison with the whole milk. After the removal of the cream, the skimmed milk is commonly counted so poor that it is used only as food for chickens or domestic animals. Yet, considering its market price—about half that of whole milk—skimmed milk is a cheap form of nutriment. In many dishes, skimmed milk may wisely be substituted for water, thus enabling one to use less of the more expensive proteids. When it is necessary to economize, skimmed milk answers quite well for milk toast, milk soups, milk sauces, or for the liquid in cornstarch, tapioca or bread puddings, etc.

Condensed milk is a form of milk from which by special treatment, much of the water has been evaporated. This work can not be done in the household, but it forms a very large and important commercial industry. One condensed milk factory, which still flourishes near New York City was established at the time of the Civil War, when this kind of milk had large sales.

Condensed milk, in the unopened can, will keep sweet in almost any climate, and for an indefinite period. The reason for this is the fact that any bacteria originally present in the milk were destroyed by the heat used in condensing. Even after a can has been opened, such milk spoils less quickly than fresh milk. It should be turned at once from the can, after opening—even if only a small portion is to be used immediately. There is danger of poisoning from milk and from any other class of canned goods left standing in the open tin.

Although condensed milk has several features in its favor for general cooking purposes it proves more costly than fresh milk. Compared with cream, the condensed milk is the less expensive. It is a wise economy to buy unsweetened brands. Not only are they suited to a larger

range of foods, but one actually obtains more milk for the same money than from the sweetened forms.

Readings: Milk as Food, Farmers' Bulletin No. 74; Care of Milk on the Farm, Farmers' Bulletin No. 63; Facts About Milk, Farmers' Bulletin No. 42; Souring of Milk and Other Changes in Milk Products, Farmers' Bulletin No. 29; Milk and Its Products (Wing), pp. 66-94, on Milk, and chap. XIII., on Skim-milk, Buttermilk, etc.; Atlantic, Aug. 1907, on "The City and Its Milk Supply;" Food Products of the World (Greene), chap. XIII., on "Milk and Milk Foods."

CHEESE.

Chemical Composition.

Proteid 32.9, fat 31., water 26.9, mineral matter 4.5.

The proteid of milk, called casein, forms the basis of cheese. When milk turns sour, and curdles, the white, solid substance is almost entirely casein.

There are other ways of obtaining the casein in a mass. For example, the milk may be clotted by rennin. (The extract of rennin is usually prepared from the stomach of young calves.)

The general plan followed in making most kinds of cheese is to let the casein separate from the liquid portion, called whey, which is drained off. The firm mass is then set away to ripen. This ripening or curing process may extend from a few weeks to many months. By lengthy curing a decided flavor develops. "Mild" cheese is that cured for only a short time. Certain cheeses, such as schmier-kase are used in a quite fresh state.

Cheese, in some form, has been made from ancient times. It was known long before butter. Among the early Egyptians goat's milk and sheep's milk were used in cheese-making. The Romans were partial to cheese, even bringing it in from foreign countries. At the present day, cheese is used as an article of diet to a greater extent than ever before. (One wit says that this age will go down to history as the "Cheese Age.") In our country, the two greatest cheese-making states are New York and Wisconsin. The output of the two together is three-fourths of the total amount made in the United States.

There are now manufactured more than one hundred and fifty different kinds of cheese, but they may all be roughly grouped under four classes: (1) Those made from whole milk to which cream has been added. Such cheeses usually have a very decided flavor. They are expensive, and are made mostly in Europe; (2) Whole milk cheese, sometimes called "full cream," which means that none of the cream has been removed from the milk. This is one of the best kinds of cheese for general cooking purposes. In America it is the variety usually meant by the term "cheese;" (3) Skimmed milk cheese. A familiar example is schmier-kase or cottage cheese; (4) Filled cheese. This consists of skimmed milk to which lard, or other cheap fat has been added. Such fat is the "filling." It forms a poor substitute for the natural fat of the milk. This kind of cheese is tough, has a poor flavor and becomes very greasy in warm weather. If left in the wrapping paper for awhile, the fat comes from the cheese, and soaks into the paper. Filled cheese is very unsatisfactory for cooking, because the heat makes it tough and ropy. The cost of making such cheese is said to be only about four or five cents the pound, yet dealers often sell it at twenty-five cents the pound, as full-cream cheese. This fraud has hurt the sale of cheese exported from the United States to Europe. Some of our dairy states try to enforce a law against it. Canada will not allow the manufacture of either skimmed milk or filled cheese.

The amount of nutriment in cheese is very great. Compared with an equal weight of beef, cheese contains about three times as much proteid and twice as much fat. On account of its denseness, cheese may easily disagree with persons who eat it in large quantities, or unmixed with some bulky food. Hominy, bread, macaroni and potatoes are thought to be the best forms of starch to use with cheese. At any meal where cheese is served as the main proteid, there should be offered also vegetables or fruits having a moderate amount of cellulose. Among the most suitable of these are lettuce, tomatoes, spinach, apples and prunes.

Cheese is better adapted for use by persons doing muscular work than for those taking little exercise.

Although cheese is commonly eaten raw, it may be used in many cooked dishes. The heat of cooking, by softening the cheese, makes it more digestible; but it must be eaten at once. If allowed to cool after cooking, it grows very tough and thus greatly taxes the digestive organs.

Readings: Food Products of the World (Greene), chap. XV.; Milk and Its Products (Wing), chap. XII.

EGGS.

Chemical Composition.

Edible part: Water 73.7, proteid 14.8, fat 10.5, mineral matter 1.

Naturalists say that there is no bird known whose egg is actually unwholesome as food. Fishes' eggs, called "roe" are regarded by many as a delicacy, while turtles' eggs meet with approval.

However, hen's eggs are those in common use for cooking purposes. A hen's egg consists of shell, membrane, white and yolk. The yolk appears to be held in position by the little cords of albumen, one extending to each end of the egg. On the yolk there may be seen a light colored speck, which is the germ. The white is mainly water containing albumen dissolved in it. The yolk contains many substances, its color being given by a yellowish oil.

Although certain people prefer stale eggs—the Chinese liking ducks' eggs that have been buried in the ground for about a year, until they turn black and hard—Americans wish eggs as fresh as possible. There are several ways of deciding whether an egg is fresh, without breaking the shell. Held in the hand, before a bright light, (called "candling" because the light formerly used was a candle) a fresh egg appears clear. The shell of a fresh egg is rough and dull-looking, while the shell of a stale egg is smooth and shiny. If placed in a pan of water, fresh eggs remain at the bottom. An egg that rests on its side in the water is fresher than one that tilts on end. When eggs float, they are stale, and, as a rule, unfit for use. The cause of the floating is that as the egg grows old, its fluid contents evaporate through the shell, and the air enters to take their place. Thus the egg grows light in weight.

Also, the action of the air on the contents of the egg causes spoiling. Hence, to exclude the air, and to preserve for future use, we pack them in bran, sawdust, cottonseed and other like cheap substances. Or, they may be coated with grease, varnish, etc. As eggs spoil less quickly at low temperature, dealers keep large quantities in cold storage, somewhat above freezing point. But eggs remain good for only a short time after being taken out of such storage places.

Packed eggs, if well kept, may be quite wholesome, and are useful in many ways when fresh eggs would be too high-priced.

The flavor of even perfectly fresh eggs is not always pleasing. Onions and some other highly flavored articles, if fed to hens, injure the flavor of the eggs. A like result may occur if eggs are stored in places where the air is tainted by decaying vegetables.

When cooking eggs, the lower the temperature the better. The albumen of egg plainly shows coagulation at about 160° F. The white then grows almost opaque, but is quite tender and jelly-like. At 212° F., the albumen becomes stiff. It has been proved that the time required for digesting a soft-boiled egg is a little short of two hours, while a hard-boiled egg needs as long as three hours. In dishes where the hard-boiled white is chopped fine, it may be less of a tax on the digestive organs. Fried eggs, "turned over" are perhaps as indigestible a form as could be invented. The harmful effect of a high degree of heat on the texture of albumen is plainly shown in the toughness of sponge cake or angel cake baked in too hot an oven. The curdling of custard is another, altogether too familiar, example. However, the coagulation of albumen by heat serves a useful purpose in clearing coffee, soups and jellies. For this, the white of egg, being almost a pure solution of albumen, is used. When mixed through the liquid and heated gradually, it gathers up any loose particles and holds them, thus leaving the liquid clear. In breaking eggs a little of the white always clings to the shell. So, if one wishes to economize, the shells may be crushed—after the outside has been well washed—and then used for clarifying.

When eggs are combined with other ingredients it is generally for the purpose of giving lightness, or for thickening and enriching. If used for making a mixture light, they need considerable beating, but if added for thickening, they require a small amount of beating.

With regard to the relative cost of eggs and meat, it has been decided that eggs at twelve cents the dozen are cheaper food than meat. When eggs cost twenty-five cents the dozen they are more expensive than meat, as a source of proteid.

Since eggs contain no starch, and furnish food in a concentrated form, they should be served with starchy foods of the coarser kinds, such as potatoes, or bread made from either rye or whole wheat flour. It is well to serve at the same meal with eggs, some fruits or vegetables having considerable cellulose, as apples, peaches, pears, spinach, tomatoes or asparagus.

Eggs are used in other ways than as food. In the manufacture of photographic paper, there is large demand for the whites of eggs. The yolks, also, have certain uses in the arts.

There are on the market a number of egg substitutes, egg powders, custard powders and the like. While some of these contain eggs others do not. Hence, their use is questionable even in preparing food for persons in good health. For invalids, who may need proteid for nourishment, it is very unwise to depend upon such articles.

Reading: Eggs as Food, Farmers' Bulletin No. 128.

SHELLFISH.

In cookery, the name shellfish is commonly given to oysters, clams, mussels, scallops and other similar creatures enclosed in shells. Between shellfish and fish there are many points of difference, one of the most noticeable being the fact that shellfish have no bones—only a bony covering.

The shrimp, prawn, lobster and crab are also sometimes called shellfish but their bodies are jointed, and their covering is less hard, being more of a crust than a shell.

OYSTERS.

Chemical Composition.

Water 88.3, proteid 6.1, carbohydrates 3.3, mineral matter 1.9, fat 1.4.

Among shellfish, the oyster is the most popular food, and has been so from ancient times. The early Romans cultivated oysters, without them no feast being thought complete.

When the first settlers came to this continent, they found the Indians dealing in oysters. The coast dwellers collected the shellfish and sold to tribes living inland.

Not only does the oyster form a favorite food of man, but it is much liked by certain sea creatures. The star-fish and whelk are probably the greatest destroyers of oysters, and sometimes cause heavy loss to the oyster-farmer.

Because of the extensive traffic in oysters there is much danger that they may become extinct, so the United States government has adopted means for their cultivation.

The oyster, when young floats about for a short time, and then settles, usually on a rock or some other firm substance, and remains there—unless removed by force—for the rest of its life. It has no means for moving about, not even a foot for digging as has the clam.

In structure, the oyster is a soft mass, held between two oblong, rather flat shells (or, a shell having two valves). Of these, the lower, on which the oyster always rests, is deeper than the upper. The shells are held together at one end by a sort of hinge. Near the other and broader end is a dark spot, commonly called the blue spot, or incorrectly, the eye. Fastened to this spot, on either valve, is a tough muscle by which the oyster can open its shell to obtain food, or close it against enemies. The oyster has no mouth but there is a small opening near the hinge, through which food passes. It breathes by means of gills, four thin layers of substance about its outer edge. The heart consists of two lobes which may be seen near the tough muscle connecting the shells.

Oysters live in shallow water along the sea-coast, their places of growth being called oyster beds. If the oysters happen to be scattered some distance apart, they reach a larger size than when crowded close together. In the latter case many of the oysters at the base of the pile die because they can not open their shells for air or food.

The various nations raising oysters have adopted different substances to which the young oysters may cling. In

Holland, tiles set up on edge, are placed throughout the oyster beds. The Japanese provide branches of bamboo. In Florida, the roots of the mangrove trees, growing far out into the water, afford a natural support to the oyster. In most of the large oyster beds of the United States, the owners put down clean oyster shells, pebbles or rough stones.

Oysters are obtained by tonging or dredging, the latter method being used when the oysters are clustered thickly and the former when they are scattered singly. Often the young oysters, when from an inch to an inch and a half in length, are taken from places where they grow near together, and "planted" farther apart in other beds. The object of this is to give more room for growth, as the larger oysters bring the higher price.

Salt oysters are often freshened by being taken from the ocean and placed for a day or two near the mouth of a river where they may absorb fresh water. Under such treatment, the oyster loses some salt, and also certain other flavoring matters. This method is usually called plumping or fattening. Often, however, the oysters are not truly fattened, but only swelled, or bloated, by the amount of fresh water absorbed. For the same purpose, retail dealers sometimes put into tubs or cans of oysters a large amount of ice or cold water. Oysters so treated may be known by their pale color. They shrivel badly in cooking. Thus, while they still retain the name oyster, the housekeeper buys mostly water—and at a high price. This practice of plumping, and the use of preservatives, are the main reasons for avoiding oysters that have been shipped to points far distant from the sea coast.

Even under the best conditions, in buying oysters, we pay mainly for flavor and delicacy of texture. Both of these features are of considerable value in the diet. In addition, oysters have the virtue of being an easily digested food. This is because they contain very little muscular fibre. Also in the oyster there occurs a ferment which aids in its digestion, when eaten raw. But as regards nutriment and cost, oysters are an expensive food. For twenty-five cents we can obtain only about one-fourth of a pound

of oysters, while for the same money we might have ten pounds of corn-meal. Besides the oysters consist mainly of water, while the corn-meal is almost solid food.

Sometimes oysters are found having a green color, and it was formerly thought that they might be poisonous. Now, however, this is not considered objectionable and the color is believed to be due to certain tiny vegetable growths on which the oyster feeds. In England, green oysters are preferred.

In preparing oysters, whether for serving raw, or for cooking, they should first be drained free of juice. (If this liquor is needed for use, it should be strained through a fine sieve.) After this, it is wise to lift each oyster singly, and examine it closely for pearls, or bits of shell. One should take especial care if the oysters are to be served raw, as in this form they are swallowed without mastication, and a sharp piece of shell might cause serious injury or even death.

Either cayenne pepper or paprika is preferable to black or white pepper in seasoning oysters or other shellfish. Not only do the red peppers blend better with the flavor of such sea-food, but they also stimulate digestion.

Although the shell of the oyster might appear to be worthless, it is sometimes ground fine, and used as a fertilizer. When coarsely crushed, it meets with ready sale as a food for poultry.

Pearls, one of the curiosities of nature, are seldom found in the oyster of our coasts. When they do occur, they are usually poor in size and color. The United States has a fairly important industry in pearls from fresh-water mussels, for which Iowa is the main shipping point. In Northern Australia and adjacent countries pearl-fishing is a great commercial enterprise.

Readings: Life and Her Children (Buckley), pp. 107-110; Everybody's Magazine, Vol. XX., pp. 46-56, on "The Quest of the Pearl;" Food Products of the World (Greene), chap. X., on "Shellfish and Turtle."

CLAMS.

The clam of our day was formerly called clamp, from the firm clamp of its shells. In general structure this shellfish is much like the oyster.

The two main varieties in use as food are the quahaug, also spoken of as the round or hard clam, and the long or soft clam. In the New England States the word "clam" means the soft clam. This part of our country has long been celebrated for its "clam-bake," a method of cooking learned from the Indians. Some say that the well-known clam chowder, also, was first made by the Indians, while others claim that the early French settlers invented the dish.

The quahaug is the common clam of the New York markets. When well-grown its muscular fibre is very tough, so this clam is generally chopped fine, and given long, gentle cooking. Little Neck clams were originally a choice small variety from Little Neck Bay. Now, any young quahaugs are called Little Necks. They are much used for serving raw.

It is rather curious that the money or "wampum" of the coast Indians was in former times often made from hard clam shells, the blue spots being especially prized for this purpose. Such money was either carried loose, or strung on sinew thread, sometimes six feet in length. Not only was it in use among the Indians, but the Dutch and English traders adopted it in preference to European coins.

LOBSTER; CRAB.

Both the lobster and the crab have been found difficult to digest. This is thought to be due to their close, tough muscular fibre. They frequently feed on refuse matter, which may make their flesh unfit for food. Because they are a tax on the digestive organs, one should never take with them very cold dishes. (Lobster salad and ice cream eaten in haste have often caused repentance at leisure.)

While lobsters and crabs are usually sold alive, sometimes they are boiled before being placed on the market. It is unwise to buy them in the cooked state, as one can not decide from their outward appearance how long they have been kept. Such food, when eaten stale, may cause ptomaine poisoning.

Reading: Life and Her Children (Buckley), pp. 167-172.

FISH.

Average chemical composition of white-fleshed fish: Water 75 to 80 per cent, proteid 12 to 18 per cent, fat and mineral matter, about 4 to 6 per cent.

For cooking purposes, fish are classed as dark-fleshed and white-fleshed. The dark-fleshed fish have fat throughout the body. Among the best known of these are salmon, mackerel and herring. White-fleshed fish—such as cod, perch, catfish—have most of the oil in the liver.

Dark-fleshed fish are more nutritious, but not so easily digested as those having white flesh. Salmon is considered the most nutritious fish, ranking about equal to beef in this respect.

Fish have their finest flavor, and are the most wholesome when used quite fresh. In buying fish, one should select only those having firm flesh, red gills, full bright eyes and bright scales. (Certain kinds which have no scales are usually skinned before being offered for sale.)

As soon as fish is received, the scales should be removed—also the head, usually—and the intestines. After scraping all blood from the backbone, the fish should be rinsed in cold water. (This needs to be done quickly, so that flavor may not be lost.) Then it is well to sprinkle the fish inside and out with salt and pepper.

If not ready to use the fish at once, it should be put in as cool a place as possible; but not in the refrigerator for fear it may give an unpleasant flavor to other foods.

In winter, one can sometimes obtain none except frozen fish. They should be used as soon as possible after thawing, because they spoil quickly.

In soaking salted fish, such as mackerel, the salt draws out most rapidly if they are put to soak with the flesh side down.

When using sardines, salmon, or other canned fish, the entire contents of the can should be turned out, as soon as opened. Even if a part is to be kept for later use, it must not be left in the tin. Cases of poisoning have been traced to lack of such care.

In the various methods of cooking—especially that of boiling—fish need to be handled gently. The flesh breaks apart easily, because the muscles are large and there is but little connective tissue between the fibres.

Fish should be served with starchy food, potatoes or bread being the most suitable. White-fleshed fish need the addition of melted butter, or other fat.

For most persons, the flavor of fish is improved by using with it vinegar, lemon juice, cucumbers with a sour dressing, or tomatoes. These are hygienic adjuncts because they make the fibrin more tender, help to dissolve the lime, of which fish contains a large amount, and aid in the digestion of fat.

Some persons still hold to the old belief that fish is good food for the brain. There are no facts to prove this. Nations living almost entirely on fish have not shown more than the average intelligence. Unfortunately there is no known brain food. The best way to have the brain in good working order is by keeping the entire body well nourished.

Another old idea—that fish should be eaten on Friday—has a better foundation. With some, this is a religious belief. There exists also a physiological reason. Fish, being a less hearty food than meat, and more easily digested, allows the system somewhat of a rest. Thus it is probably wise to eat fish on some one day of the week. This need not be any special day, so far as hygiene is concerned. But, on account of the religious belief held by many, and the large sales of fish on Friday, dealers in small cities and towns receive their fresh stock of fish that day—hence it is the best time to buy.

Certain portions of fish form the basis for various manufactured articles. Thus, the liver of the cod supplies the well-known cod-liver oil; while the roe of the sturgeon is packed as caviar. From the sturgeon is obtained, also, material for the finest grade of isinglass. There are besides, fish pastes and fish flours, while even a kind of jewelry is made from the scales of certain fish. Some coarse varieties of fish, unfit for food, are made into commercial fertilizer. This is, at present, quite a large industry. The same principle was long ago applied in a small way by the early

settlers of New England, one of whom left the account that "according to the manner of the Indians, we manure our ground with herrings"—"an acre thus dressed will yield as much corn as three acres without fish."

With our usual wastefulness of natural resources, some of our finest food fishes have been caught in such numbers that they are in danger of becoming extinct. To prevent this, the United States government now maintains fish hatcheries, from which the waters are re-stocked. Among the most noted fish thus cared for are the salmon of the western coast, the whitefish of the Great Lakes, and the shad of eastern waters.

One cause for the present scarcity in many kinds of fish is the enormous canning industry. Of this, the most important branch is the salmon canning of the Pacific Coast, while next to it stands the sardine canning of Maine. Also, various kinds of fish—the cod, mackerel and herring being familiar examples—are preserved by drying, salting or smoking.

Not only in our own day, but as far back as history can trace, fish rank as an important article of diet. The early coast tribes had little other food, and their main industries were the making of hooks, spears, nets and other articles of use in fishing.

Among the ancient Romans, even a meeting of Senators might be adjourned to allow attendance at a sale of fresh fish. To the Assyrians fish were of so much moment that their main deity was a water-god, and they built statues representing him as part man and part fish. In fact, every nation, both in ancient and modern times, has quaint customs and legends relating to fish.

Readings: Fish as Food, Farmers' Bulletin No. 85; Anthropology (Tyler), pp. 212-214; Charicles (Becker), pp. 288-289; The Pleasures of the Table (Ellwanger), pp. 26-27, 32-35, 42-47; Home Life in Colonial Days (Earle), pp. 115-125; Food Products of the World (Greene), chap. IX., on "Fish;" The Boston Cooking School Magazine, Vol. XIII., pp. 403-407, on "The Catching of the Mackerel."

MEAT.

Chemical Composition.

Typical example: Beef.

Water 75., proteid 14., fat 10., mineral matter 1.

By the word meat is usually meant the flesh of the domestic animals used for food, while the term game applies to wild animals or birds, and poultry to domestic fowl.

The domestic animals supplying meat are beeves, calves, sheep, lambs and swine.

Meat is made up of bundles of muscular fibre, held together by connective tissue. A layer of fat occurs on the outside, and there is also some mingled through the lean or muscular part. Marrow, a peculiar kind of fat, is found in certain bones. Bone, the framework of the animal, forms a large percentage of the weight. Cartilage, commonly called gristle, occurs mainly about the joints. (When cooked, especially at a low degree of heat, cartilage yields gelatine.) Meat also contains flavoring matters, called extractives.

Within a short time after an animal is slaughtered, its flesh becomes tough. Dealers generally keep meat for a week, and often much longer, because there is gradually formed in it an acid which acts on the fibres making them more tender. After meat has been kept for some time its flavor changes, and it is thought by many to be finer than when fresh.

As soon as meat is brought in from market, it should be taken out of the wrapping paper. This often contains chemicals that may spoil the flavor of the meat, or even make it unwholesome. Also, the paper soaks up some of the juices of the meat, which thus becomes less nourishing.

Any bruised or discolored parts should be cut away, and bits of sawed bone scraped off. If the meat is not to be used at once, it is well to remove any moist looking connective tissue, and also the marrow—if any—from the bone. Then the meat should be put in a cool place. If set in the refrigerator, it must never be laid directly on the ice. This method draws the juices out of the meat, and

makes the refrigerator uncleanly. Nor should the meat even be placed beside the ice, as the ice-chamber is the warmest part of the refrigerator.

It is best not to sprinkle salt and pepper on the meat when putting it away, unless the weather is very warm, and the meat seems likely to spoil. Even in this case, it is better to cook the meat slightly, just enough to sear the outside, and heat it throughout. If salt is put on uncooked meat, part of the juice is drawn out, and thus some flavor and nutriment are lost. Besides, salt toughens the fibres.

Meat, before cooking, needs to have surplus fat trimmed off, and to be wiped with a damp cloth. (The washing of meat wastes its juices.)

The heat of cooking affects meat in several different ways. A low temperature makes the fibres tender, softens the connective tissue, and also the fat. For soup making, when it is desirable to draw out the juices of the meat, it should be covered with cold water and allowed to heat very slowly.

A very high temperature hardens the fibres, toughens the connective tissue, and makes the fat somewhat unwholesome.

Meat may be cooked under-done, rare or well-done. By under-done meat is meant that which has a sort of purplish red color, and a flabby texture. Such meat may often be unwholesome. Rare meat is that in which the coloring matter remains red, although the heat has stiffened the flesh so that it seems fairly firm. Any lean, outer surface of such meat looks "puffed up," because the water held in the juice has been expanded into steam, by heat. Well-done meat has a brownish gray color throughout, and is quite firm, sometimes even tough, when cut. Such meat is cooked longer, or at a higher degree of heat than rare meat. Of the two, rare meat has the finer flavor and is the more easily digested, but the thorough cooking of the well-done meat is more likely to destroy any disease germs present.

As salt toughens the fibres of meat, seasoning should not be added until nearly the end of the cooking, or in some cases not until the cooking is finished.

There are several reasons for re-heating meat that must be served a second time. Cold meat, and cold articles in general, are more of a tax upon the digestive organs than is warm food. Pieces of meat not large enough to use well alone may be combined with vegetables or a sauce, as an economy. The same kind of meat served under different guise at various meals will be more palatable than if treated in one way at all times. When re-heating meat that is tender, one should let it cook only a short time; otherwise, it loses flavor and becomes less digestible. In case the meat be tough or underdone it is best steamed or simmered very gently until tender. The liquid in which it has been cooked may form the basis for a sauce.

Meat for hash or similar dishes should be freed from fat, gristle and bone. The meat may be chopped fine, sliced thin or cut into small blocks of an even size.

Poultry and all light-colored meats are most suitably served with a white or light-colored sauce. With the dark meats a brown or other dark sauce is appropriate.

As a rule, warmed-over meat needs more seasoning and flavoring than fresh meat.

Re-heated meat is served under many different names, such as mince, hash, croquettes, timbales, etc.

The foods suitable to serve with meat are the starches, as bread, potatoes, rice and macaroni. Watery fruits and vegetables have value also, because the acids they contain soften the fibres of meat, and aid in digesting the fat.

Opinions differ greatly with regard to the amount of meat needed in the daily diet. Probably most Americans now do not eat meat more than twice a day. Many think it wiser to use meat at only one meal. Some omit meat altogether, and depend on other foods for proteid. While there are dangers from an over amount of meat in the diet, it appears true, in general, that persons who eat very little proteid become weak, feel "run-down," and take diseases easily. It is believed now, that by eating slowly, (so that food is divided into very fine particles) one may be strong and healthy on much less, both of proteid and of other foods than was formerly thought necessary.

With regard to the nutriment and digestibility of meat, it is found that the tender cuts are the most easily digested,

but those parts that have grown tough by exercise are the most nutritious. However, by careful, slow cooking, and a wise addition of flavoring and seasoning matters, the tougher portions may be made tender and perhaps readily digestible.

To a great extent, the retail price of meat is based on the quality of tenderness. The more tender, the greater the cost. As each animal contains only a few tender portions, the scarcity of such cuts aids in keeping up the price. Hence, persons who economize wisely, buy those tougher portions whose first cost is low, and nutriment considerable.

Among the meats, beef is considered the most nutritious, and the most stimulating. Mutton stands as the most easily digested (aside from the fat) because it has short, tender fibres. Veal, being from an immature animal, is a meat that spoils quickly. It needs care both in preparing and cooking in order to be wholesome. Pork, on account of the large percentage of fat, is not a suitable food for summer use. Being a meat in which disease germs are often found, pork needs very thorough cooking.

Fresh meat is that obtained by recent slaughtering, or which has been kept only by refrigeration. The term cured meat—salted, pickled or smoked applies to meat kept by the use of salt, vinegar, spices or smoke, either singly or in combination.

As a rule, fresh meats are more easily digested than cured meats. Pork seems to be an exception. By some it is thought that the salt separates the globules of fat, which can then be acted upon readily by the digestive juices.

Even among uncivilized peoples, some ways of keeping meat for future use have long been known. In those parts of both North and South America where the atmosphere is warm and dry, the native tribes cut meat into thin sheets or strips and expose it on poles or racks in the open air, where it may dry by the heat of the sun. This is called jerked meat. Sometimes a different flavor is given by smoking it, a slow fire for this purpose being built beneath the rack. The North American Indians long ago made pemmican by drying the meat, pounding it very fine, and packing it in buffalo rawhide. To exclude air,

the pemmican was covered with a layer of marrow fat. The early tribes knew only these two methods—drying and smoking. Curing by means of salt was an invention of civilized man.

Until within recent times most well-to-do families, especially those living in country districts, cured their own meat. Such work formed an important and laborious part of the household duties. Now, the amount of home-cured meat is very small compared to that put up by the huge packing houses in Chicago, St. Louis, Kansas City and elsewhere.

The packing industry began in New England, during the seventeenth century, when large quantities of pork were packed in barrels for shipment abroad. So greatly has the business grown, both for home use and for export trade that the value of the swine slaughtered in one year averages over three hundred million dollars. This is only a small part of the income from such sources, for packers now prepare meat from all kinds of domestic animals. Since refrigerator cars became known it has been possible to ship meat in the fresh state to any part of our country. It is also sent to Europe, being taken out of the refrigerator cars, and placed at once in cold storage rooms on the ocean steamships. (Abroad, the best cuts of American beef often retail for as much as forty cents the pound.) As a rule, only the choicer parts of the animal are shipped for use in the fresh state.

Of the poorer portion, or offal, hides form the most important part, bringing on an average, six dollars each. Tongues rank next, and are sold either in the fresh or cured state. Fat stands third in value. Much of the oil drawn from it is used in the manufacture of oleomargarine. From pork fat, two grades of lard are made—leaf lard and steam lard. The former is the firmer and better, being rendered out of the fat lying about the kidneys. Steam lard, the poorer grade, is made of scraps taken from any part of the animal. The fat has other uses also, such as the making of machine oil, soap, etc. Any inferior lean cuts are canned, dried or made into sausage and other preparations. Gelatine is obtained by cooking the cartilage, bone, etc. The bones are also ground for fertilizers.

Besides these, there are many other uses for the refuse parts. It is said that the packers make their profit, not on the choice portions of the animal, but from the many articles made of the offal.

Readings: Meats, Composition and Cooking, Farmers' Bulletin No. 34; Home Economics (Parloa), pp. 168-194; Food Products of the World (Greene), chap. III., IV., V., VI.

SUITABLE COMBINATIONS OF FOOD.

WINTER BREAKFASTS.

Hearty Meal.

Oranges.
Oatmeal Mush, with Milk.
Pork Chops. Creamed Potatoes.
Corn Dodgers.
Coffee.

Light Meal.

Oranges.
Oatmeal, Milk.
Coffee.

Hearty Meal.

Corn Meal Mush.
Creamed Dried Beef. Potato Cakes.
Graham Gems.
Stewed Apricots. Cocoa or Coffee.

Light Meal.

Graham Gems.
Stewed Apricots.
Cocoa.

Hearty Meal.

Baked Apples.
Rye Mush.
Hamburg Steaks. Stewed Hominy.
(Bread, Butter.)
Stale Bread Griddle Cakes. Syrup.
Cereal Coffee.

Light Meal.

Baked Apples.
Rye Mush.
Cereal Coffee.

SUMMER BREAKFASTS.

Hearty Meal.

Strawberries.
Boiled Rice.
Poached Eggs. Young Onions.
Dry Toast.
Coffee.

Light Meal.

Strawberries.
Dry Toast.
Cocoa.

Hearty Meal.

Cantaloupe.
Germea.
Broiled Mutton Chops. Radishes.
Drop Biscuits.
Cereal Coffee.

Light Meal.

Cantaloupe.
Germea.
Cereal Coffee.

Hearty Meal.

Peaches.
Cream of Wheat.
Browned Hash. Panned Tomatoes.
(Bread, Butter.)
Cocoa or Coffee.

Light Meal.

Peaches.
Cream of Wheat.
Cocoa.

WINTER DINNERS.

Tomato Soup.
Broiled Steak.
Baked Sweet Potatoes. Creamed Cabbage.
(Bread, Butter.)
Prune Drop Dumplings. Coffee.

Vegetable Soup.
Roast Spare Rib. Apple Sauce.
Cole Slaw. Stewed Navy Beans.
Corn Bread.
Currant Bread Pudding. Coffee.

Roast Beef. Brown Sauce.
Mashed Potatoes. Spinach.
Stewed Carrots.
Old-fashioned Short Bread.
Canned Blackberry Pie. Coffee.

SUMMER DINNERS.

Stuffed and Rolled Steak.
Browned Potatoes. Stewed Asparagus.
Corn Pudding.
(Bread, Butter.)

Strawberry Tapioca. Coffee.
Roast Lamb or Mutton.
Spiced Peaches.
Baked Macaroni. Stewed Green Peas.
(Bread, Butter.)
Fresh Cherry Pie. Coffee.

Baked Fish.
New Potatoes with Cream Sauce. Stuffed Tomatoes.
String Beans.
(Bread, Butter.)
Cup Custard. Coffee.

WINTER SUPPERS.

Corn Meal Mush.
Frizzled Beef with Egg. Pepper Sauce.
Hashed Browned Potatoes.
(Bread, Butter.)
Stewed Raisins. Lemon Drop Cakes.
Tea.

Milk Toast.
Cold Boiled Ham. Lye Hominy.
Biscuit.
Canned Apples. Gingerbread.
Cocoa or Tea.

Rye Mush.
Creamed Salmon. Potato Salad.
(Bread, Butter.)
Preserved Plums. Seed Cookies.
Cereal Coffee or Buttermilk.

SUMMER SUPPERS.

Boiled Rice.
Cold Roast Beef. Sliced Tomatoes.
Corn Gems.
Raspberries. Graham Wafers.
Tea.

Cream of Wheat.
Fried Chicken.
Hot Biscuit.
Sliced Peaches. Sponge Cake.
Lemonade.

Cold Boiled Tongue. Corn Fritters.
(Bread, Butter.)
Baked Pears. Peanut Cookies.
Hot or Iced Tea.

FOR THE SCHOOL LUNCH BASKET.

Roast Beef Sandwiches. Spiced Cherries.
Nut Drop Cakes.

Cottage Cheese. Whole Wheat Sandwich.
Apricots.

Frizzled Beef Sandwich. Potato Salad.
Apple.

Sardines. Rye Bread Sandwich.
Orange.

Peanut Sandwich. Stewed Pears.
Cup Custard.

Beef Loaf Sandwich. Sliced or Whole Tomato.
Sponge Cake.

Home-made Sausage. Parsley Sandwich.
Stewed Prunes.

Baked Beans. Boston Brown Bread.
Apple.

Cold Roast Chicken. Celery Sandwich.
Peaches.

Chopped Cheese Sandwich (whole wheat bread).
Apple Sauce. Oatmeal Cookies.

Mutton Sandwich. Green Tomato Pickle.
Grapes.

Egg Sandwich.
Baked Apple. Gingerbread.

PART II. COOKERY.

FIRE. FUELS. STOVES.

During an early period in the world's history, the use of fire was unknown. People then lived on uncooked foods, such as nuts, wild fruits and herbs. They ate even fish and meat in a raw state. But, after fire was discovered, the cooking of food gradually became general, so that man is now often called "the cooking animal."

Among the lower animals, even the boldest are afraid of fire. For this reason, hunters keep a fire burning during the night, when camping in regions where dangerous animals may appear. Before man became well-accustomed to the use of fire, it was to him, an object of dread, and also, of worship. He readily saw its harmful effects in the forest fires, in the stroke of lightning, or in the eruption of volcanoes; while the good offices of fire appeared as it heated his rude dwelling or cooked his food; also, in the great extent of vegetable growth under the heat of the sun. So, the sun, as the source of heat and light, became to primitive man an object of worship. At a later time, there was kept in the heathen temples a sacred fire. Certain persons had charge of this, and if they let it die out, they were punished by death. Even at the present time, one finds many relics of the curious beliefs and customs regarding fire.

In the early days, it was a difficult matter to kindle a fire. Matches being unknown, the fire had to be started by rubbing two sticks together briskly until a spark appeared. (Later, there was an instrument called the fire drill.) Some people struck together two pieces of iron pyrites in order to obtain a spark. Afterward, the use of the burning glass to focus the sun's rays became known. The early settlers of our own country had no better means than a tinder box for starting a fire. Later, matches were invented. Their virtue lies in the fact that they are tipped with some material which catches fire easily, such as phosphorus. This, when pure, burns at ordinary temperature.

In order to obtain a fire suitable for household cooking, four things are needful: (1) a stove or range to hold the fire; (2) fuel; (3) some substance to start the blaze; (4) a current of air to supply oxygen.

Of the two main gases which form the air, oxygen is one. It has the power to combine with many elements, and in the process heat is given off. This occurs slowly with some substances, and quickly with others. The action, when so rapid that heat may be noticed at once, is called burning or combustion.

Speaking in a general way, the word fuel means any substance which burns readily and for a considerable length of time; and which is neither dangerous nor inconvenient to use. That part which, in its combination with oxygen forms heat is called carbon.

The temperature at which any substance begins to burn is called its kindling point. Each substance has its own particular kindling point. Some do not burn until intense heat is applied. These features may be seen in building a fire. When a match is struck the phosphorus, or similar material, instantly catches fire. This ignites the wood of the match, which in turn is applied to the kindling used in laying the fire. Although the kindling may begin to burn at once, not until it throws out considerable heat will the heavier wood or coal above it catch fire.

Common fuels may be classed as solid (coal, coke, peat, wood, charcoal), liquid (kerosene, alcohol, gasoline—this being converted into a gas), gaseous (natural and artificial gas), electricity.

SOLID FUELS.

WOOD.

Although our forests are being rapidly diminished, wood, in some parts of the country, still forms the main fuel.

Wood is commonly classed as hard and soft. The soft woods, such as pine or spruce, burn readily for the reason that they contain rosin. Also, their woody fibres are loosely held together, so that flame can easily pass through. The harder woods, as oak, hickory, maple, etc., are more compact, and do not catch fire so readily as the soft woods, nor burn away so rapidly. Thus hard wood is needed to form the body of a fire, while soft wood proves best suited for kindling. When using wood alone as a fuel, at least three-fourths should be hardwood. It is wise to have well-seasoned, dry wood, as green wood when heated, throws out so much moisture that it chills the fire. However, if one wishes to keep a fire burning slowly for a long while, some green wood may be mixed with the dry wood.

Care should be taken to have the wood cut of a length to fit easily into the stove. If too short, it allows waste space in the fire-box so that there enters more air than is needed, and the fuel burns away rapidly. Wood of too great a length may be a source of danger. In case the door to the fire-box or the lid of the stove be left open to accommodate the wood, sparks may fly out into the room. Besides, the stove does not heat well, nor can it be kept at an even temperature.

CHARCOAL.

Charcoal is obtained from hard-wood which has been slowly charred in a kiln, the part which remains having a quite large amount of carbon. As charcoal absorbs moisture readily, it should be stored in a dry place.

This fuel is seldom used in the homes of America, although many hotels employ it for the broiling of meats. It makes a very hot, even fire, well suited for such cooking. But one must be careful to use it in a well-ventilated room, and to avoid breathing the fumes, which are very harmful.

COAL.

It is believed that coal has been produced from damp vegetable matter which long ages ago became gradually buried under great masses of sand. By this heavy pressure, and also by the action of heat from the interior of the earth, the vegetable fibre was finally packed into a solid form.

The regions in which coal occurs are called coal fields. Among such areas in the United States, there are three of especially large size. An eastern field extends from Pennsylvania to Alabama, a central field from Illinois to Kentucky, and a west central area from Iowa to Texas.

Although there are many varieties of coal, these may all be grouped in two classes, anthracite (hard) and bituminous (soft).

Anthracite is noted as a clean coal, producing little soot, and making a steady fire which lasts a long time. It has been found the most satisfactory coal for cooking purposes. In appearance it is very glossy. A good quality is free from slate, and when burned, leaves scarcely any clinkers.

Bituminous coal is less compact than anthracite, and thus breaks in irregular pieces. It has a dull appearance, throws out considerable smoke, and when burned and softened, may run together in somewhat large cakes. It is less cleanly than anthracite, and does not produce an even heat. Thus it is not an entirely satisfactory fuel for cooking purposes.

Coal may be bought in various sizes, those most commonly used in the cook stove or range being called stove, chestnut or pea. One should be particular to select the kind best suited to the size of the fire-box. If the coal is too small, it will slip through the grate unburned, and thus there occurs much waste. Should the coal be too large the fire is slow in kindling and difficult to regulate. A mixture of chestnut and small stove coal does well for most household ranges, while chestnut answers where there is a small fire-box. Pea coal, because cheap, is used in many households, but it does not yield much heat, and burns away quickly. In any kind of coal selected one should see that it is free from slate. This occurs in thin

sheets, as black as coal, but with very little heating power.

If there is, in or near one's house, a space large enough for storing considerable coal, one may economize by laying in the year's supply during the summer, when the price is usually at its lowest. If coal is bought by the ton, one obtains more in proportion for the money than when buying by the basket or bushel.

COKE.

Coke is obtained from coal in the process of making illuminating gas. Certain kinds of coal are chosen and heat applied. By this means the gas is driven out, the solid portion remaining being the coke. It is light and porous on account of the tiny bubbles formed by the gas. Coke has several good features as a fuel, and compares well with anthracite, both in heating power and in cleanliness. But it proves less easy to maintain a coke fire at an even heat for a long time. There occurs especial difficulty in keeping a coke fire alive over night. Its moderate price is an advantage, although coke can seldom be obtained except from companies engaged in making illuminating gas. It very easily absorbs moisture, hence its storage place should be dry.

In England, Germany and many other parts of Europe, the manufacture of briquettes is an important industry. These, sometimes called patent fuel, are a mixture of coal or coke dust with pitch, tar, or other substances. They are pressed into any form convenient for handling, usually being about the size and shape of a paving brick.

PEAT.

Abroad, peat is largely burned as a household fuel. This substance appears to be an early stage of coal, which has not been subjected to enough pressure and heat to become coal. It is obtained from peat bogs, mainly in Ireland and Holland. It is cut into blocks, which are then dried in the sun. Being a smoky fuel, it does not meet with ready sale among well-to-do classes; but because of its cheapness, it is, among the poor, an important article of commerce. In the United States, its use is scarcely known.

LIQUID FUELS.

KEROSENE.

Kerosene, now among the most common of liquid fuels, was scarcely known commercially until about fifty years ago. It is one of the products obtained by refining crude petroleum, or "coal oil." In the United States this was first found in great quantities in Western Pennsylvania. There are now well-known areas also in Oklahoma, Kansas, Texas, etc. The only other oil fields whose size compares well with those in the United States are in the region of the Caspian Sea. The burning oil wells of that district have for centuries been held sacred by sects who worship fire.

As a source of heat for cooking, kerosene has several features in its favor. Kerosene stoves are cheap, and the fuel itself is not expensive. The heat is produced in a short time, yet does not make a room uncomfortably warm in summer.

There are also disadvantages in the use of kerosene stoves. The wicks need much care. A wick turned up too high or unevenly trimmed may cause a deposit of soot on both the stove and utensils. Besides, the wicks require frequent changing or boiling in soda water to prevent an unpleasant odor. Also, unless the stove be kept very clean, the odor is objectionable. Some of the later makes of kerosene stoves do not need so much attention.

In using any kerosene stove, one should be very careful about the following points:—have the oil tank almost full; never attempt to pour oil into the tank when the wicks are burning; do not let the fire burn so long that the oil tank becomes empty; use a good grade of kerosene, with flash point not below 110 degrees F. and higher is safer. By the flash point is meant the temperature at which vapor thrown off from the oil will catch fire. Also, do not keep a can of kerosene near the fire. Above all, in kindling a wood or coal fire, do not use the can of kerosene as a "starter." (The kerosene can in the hands of a careless woman has probably done as much damage as "the gun that was not loaded" in the hands of a careless man.)

GASOLINE.

Gasoline, another product of petroleum, although bought in a liquid form, must be converted into a gas as it is burned for fuel. Even when used with care, and in a well-made stove, it is a dangerous fuel, and should be managed only by persons of mature age.

ALCOHOL.

Alcohol, produced either from the fermentation of grain, or the distillation of wood, is at present seldom used as a fuel, except in chafing dishes, or in tiny alcohol stoves when preparing light nourishment for the sick.

It may be burned by means either of a wick or of an asbestos pad. By the latter method, the heat may be easily regulated; but any unused alcohol remaining on the pad is wasted. With a wick fitted in a receptacle, any surplus alcohol is saved.

In case the alcohol burns away before the cooking is finished, and it becomes necessary to add more one must see, before attempting this, that not a spark of fire remains, or there may be a serious accident.

Grain alcohol is more expensive than wood alcohol, but makes a hotter fire, and its odor is not unpleasant.

Wood alcohol has the advantage of being low in price, but its fumes are irritating, and it explodes rather easily. As wood alcohol is poisonous, it should never be mixed with either food or medicine. The bottle containing wood alcohol should always be correctly labeled.

Both kinds of alcohol need to be closely stoppered, as they evaporate readily.

If denatured alcohol ever becomes common, it should prove not only a cheap fuel, but a very useful one.

GASEOUS FUELS.

Among the gaseous fuels, several kinds are well-known. The cheapest form, natural gas, is obtained from the earth by boring as for petroleum. Although in quality it does not equal good coal gas, persons living in natural gas regions think themselves fortunate in having so inexpensive and easily regulated a fuel for lighting, cooking, and general heating purposes.

In the United States, the largest supplies of natural gas occur in Pennsylvania, West Virginia, Ohio, Indiana,

Kansas, and Oklahoma. The latter state yields enormous amounts at present.

The two most important kinds of artificial gas are (1) that obtained from highly gaseous coal, and (2) that made by enriching water-gas.

ELECTRICITY.

As a means of supplying heat for cooking, electricity has many good features. It proves especially pleasing for summer use, since it throws but little heat into the room. Electric stoves do not need much cleaning. With the best make of such stoves the heat may be easily regulated, merely the turning of a switch giving high, moderate or low heat, as desired. Electric broilers cook meat very satisfactorily. Large ovens answer their purpose well. In the small ovens, the heat is not always even at top and bottom. A disadvantage in electrical cooking appliances is that when out of order they must, in many cases, be shipped to the manufacturers for repairs.

Because of the considerable expense—for wiring, for especially constructed stoves and for electric power—electricity as a source of heat for cooking is in use at present only in homes of the wealthy.

STOVES, RANGES.

Although the cook stove or range is a matter of course in most American houses of the present, it did not come into use here until the country had been settled for over a century. The Pilgrims managed to do their cooking in huge open fire places. Later, heating stoves were invented by Benjamin Franklin and others. Cooking stoves did not become known until about the end of the eighteenth century. Because of the good moulding sand found near Albany and Troy, N. Y., these places early became centers of stove manufacture. The trade in stoves, however, was not general until after the opening of the Erie Canal—in the first quarter of the nineteenth century—which made transportation easier.

A cook stove of the present day is a box-like structure of iron, resting on supports which set it up several inches above the floor. It is connected with the wall only where the stove pipe enters the chimney.

On account of the heat thrown out from all its parts, a stove should be placed on either a brick hearth or a large piece of zinc. It is also well to have the wall near it covered with zinc. This is not needed in case the wall be of brick or tiles.

Ranges are classed as set and portable. A portable range is placed against or close to the wall, but is not connected with it, save by the stove pipe entering the chimney. Hence, portable ranges, like stoves, may be moved from one house to another.

A set range is built into the wall of a house. Such ranges, because much of their heat is absorbed by the wall, consume more fuel than portable ranges. Being built as a part of the house, a set range can not be removed in case the house changes hands.

There are several points of difference between stoves and ranges. Stoves have an air space about them on all sides, while ranges are open only on three sides. The fourth side, or back, which is set next to the wall has a heavy upright piece of iron extending some distance above the cooking surface. Ranges, being set directly on the floor, differ from stoves in their means of support. Ranges have at least one warming oven, while stoves have none. Many kinds of ranges are provided with boilers for hot water, but stoves have nothing better than a tank for water.

With regard to the fire-box, and the methods of regulating heat, ranges and stoves are built similarly.

The main parts of a coal stove are the fire-box, top or cooking surface, stove-pipe, dampers, oven and ash-pan.

The fire-box has at least one side lined with fire-brick. This helps to retain the heat, and also prevents warping of the metal set between the fire-box and oven. In addition it keeps the oven from growing too hot on the side next to the fire-box.

Forming the bottom of the fire-box is found the grate, which in old style stoves, was made of iron bars, firmly fixed in place, and for which a poker was needed when raking. At the present time, there are grates (called duplex) made reversible, by means of cog-wheels. The grate has two faces of different form, one being intended for

use with wood, and the other when burning coal. In its ease of raking this grate is a saver of time, strength, and fuel. By merely turning it over gently, the ashes may be cut out, without disturbing the main body of the fire.

Fuel should never be piled above the top of the fire-box. If this happens, the stove becomes red hot on top. The intense heat may ruin foods that are being cooked, and also the cooking utensils. Besides, the stove gradually becomes warped, and then the lids do not fit evenly; so heat escapes into the air instead of being kept in the stove. Thus, a red-hot stove is a waster of fuel, both at the time, and in its after effects.

The ash-pan, below the fire-box, should be emptied daily. If ashes are allowed to accumulate, they cut off the draft, and the fire does not burn well. Also, they absorb heat, thus wasting fuel. When taking out the ashes, if they are very hot or contain live coals, extreme care should be used to put them in some place where they can not cause a fire. After cooling, ashes should be sifted in order to save any unburned coal.

The inside of the oven should be kept clean. Also, the spaces around it need to be free from soot. This substance is a poor conductor of heat, and if allowed to collect, the oven does not bake well. However, it is wise to leave a thin layer of ashes above the oven in case it has the fault of baking too brown on top. The space above the oven should be cleaned at a time when the fire is out, taking off the lids, and brushing the soot into the fire-box. There is in every range or stove a special opening through which the soot collecting under the oven may be removed. This "clean out" place is differently located in the various makes of stoves. It may be found under the fire-box, at the back of the stove, or under the oven door. One kind of stove has in the floor of the oven an opening covered by an iron plate that can be removed.

The manner of setting and operating the dampers differs in the various makes of stoves. Some dampers turn up and down, others slide to right and left, etc. But the general principle is the same in all. Any opening below the fire-box lets air in, and the oxygen causes the fire to

burn faster. Any opening above the surface of the fire, admits a current of cold air. This in passing across the top of the fire, checks it.

On the inside of the stove, at the base of the stove pipe, there is always a damper for regulating the heat of the oven. To understand how this works, it is well to take off the lids, and then open and close this damper until one knows its effect in each case. When this plate is laid flat, leaving a direct opening into the stove pipe, the heat passes at once up the chimney, and the oven remains cool. If the damper be set so that the heat can not go directly into the chimney, then it must pass around the oven before making its escape, and thus the oven is heated.

The uses of the stove pipe are to carry off gas and smoke, and to aid in creating a draft. It should be cleaned free of soot once a year. The chimney, also, needs cleaning at times, especially if wood or soft coal be burned. These leave much of a deposit which makes the fire draw poorly, and which has often been the means of setting fire to the house.

DIRECTIONS FOR BUILDING AND MANAGING A FIRE IN A COOK STOVE OR RANGE.

Before beginning to build the fire, open the oven or smoke damper. Clean out the grate, empty the ash pan and replace it. Put some lightly crushed paper, excelsior or shavings into the fire-box. Above this lay small pieces of soft wood, at various angles, in order to admit a current of air to supply oxygen. Above them place larger pieces of hard wood. If coal is to be used, sprinkle a thin layer over the top. Brush any dust from the stove. Rub the cooking surface with paper. Apply blacking, putting on only a thin coat. Then light the fire. When the stove becomes slightly warm, rub lightly and quickly with a dry blacking brush, to develop a polish. (In case cooking is carefully done, a stove does not need to be blackened every day. It can be kept looking neat merely by an occasional brisk rubbing with paper.) After the fire is burning well, add fuel to half or three-fourths the depth of the fire-box. Allow this a few minutes to become warm, then set the

smoke damper so that the heat may pass around the oven. After a good body of fire has formed, the lower damper may be partly or entirely closed.

In case one wishes to keep a fire alive for several hours, but without much heat—as, for instance, between meals—there is needed first a good body of fire, with considerable fresh fuel on top. Then the lower damper may be partly closed, and the upper damper set open, or partly so. To lessen the draft still more, the damper in the stove pipe may be opened. Shortly before needing to use the fire again, reverse the position of the dampers. Should the fire not begin to burn briskly in at least five minutes, the direct draft to the chimney may be opened. It is not always wise to rake a slow fire. If done, the raking should be gentle.

When using coal, one should remember that a good fire is neither red hot nor white hot. The latter indicates that the fire is dying out—the coal losing its heat and turning to ashes. A good fire shows a bed of glowing coals beneath, and on top some black unlighted coal being gradually heated.

When adding fuel, a more regular degree of heat is kept up, and less coal burned if only a thin layer be put on at a time.

THE GAS RANGE.

There are quite a number of reasons for the popularity of the gas range. It is more cleanly and also more easily and quickly regulated than a range burning wood or coal. Because little heat is thrown out by the range, it proves comfortable for summer use. Where natural gas, or cheap artificial gas may be had, its first cost is less than that of most other fuels. Because the gas does not need to be kept burning except when in actual use, a large amount of cooking may be done by an experienced person with a very small outlay for gas. The gas should be supplied to the range through a main pipe, having not less than a half-inch bore, inside measure—a larger size is better.

The gas ranges in most common use have four burners. Of these, one is usually a large, or "giant" burner, while there are three medium-sized burners. As a rule,

there is also a small, or simmering burner. One should never invest in a gas range unless it does have a simmering burner, as this is a great fuel saver. Any article may be brought to a boil on one of the medium burners, and then moved to the simmering burner where the cooking will continue with a very small flame.

To each burner there runs a supply pipe. One should study the location of each, and become familiar with its valve, and the proper way of opening and closing. When not in use, the valves must be turned off very tight as gas will escape through even a tiny opening.

DIRECTIONS FOR COOKING WITH A GAS RANGE.

In lighting the gas, strike the match first, to make sure that it will burn, then give the gas valve about one turn—to the left—let the gas flow a second, then touch the match to it. Should the match be held at the opening before the gas flows out, it may burn back—known by a roaring sound—in the pipe, instead of lighting properly at the burner. Turn the valve to the right when less heat is needed, and to the left to increase the heat. Always be careful that the flame burns blue and not yellow. The yellow flame, which shows unburned carbon, wastes gas. Have the gas turned up only as high as positively necessary for doing the cooking. In boiling or stewing, after the liquid comes to a boil, the flame may be turned very low, for the rest of the time—although the simmering burner saves still more gas. In case this small burner is in use, an asbestos mat may be placed over any larger burner, and under utensils which hold food needing little heat.

When an article has finished cooking, turn out the gas at once, even if intending to use it in a few minutes. Then light again when ready to use. Matches cost less than gas.

By the use of a steamer, one may economize in fuel by cooking an entire meal over one burner.

Care should be taken not to let anything boil over and clog the burners. In case this happens, they need to be thoroughly cleaned, or else they burn unevenly and thus waste gas, besides being unsightly and perhaps giving off an unpleasant odor. Under the top burners there is a movable sheet of metal, usually galvanized iron,

which should be taken out occasionally and well scrubbed.

A gas range generally has two ovens, one above the burners for baking bread, cakes, etc., and the other, below the burners, for broiling meat, making toast, browning the top of foods, etc. As a rule, there are two oven burners. Between these is a small burner, called a pilot. When wishing to heat the oven, first set both oven doors open. (If this is not done, there may be an explosion.) Then strike a match, turn on the pilot valve, and insert the match in the opening around the pilot, on the outside. When the pilot lights, turn on the two oven burners, which will catch, with a slight explosion, from the pilot. Turn off the pilot. Then close the upper oven door, and regulate the burners as desired before closing the lower door. The burners should be lighted about 10 or 15 minutes before one is ready to use the oven. In cooking most articles, one burner may be turned off after the oven has become well heated. Generally, the back burner is the better to turn out, as the opening of the door to look at articles chills the front somewhat. Thus, if the front burner were turned out, baking might be uneven. In order to save gas, all heat may be turned off 5 minutes before baking is finished, as the range remains hot for a long time.

Readings: The Fairy Land of Science (Buckley), pp. 171-192; Manual of Mythology (Murray), pp. 200-207, on the Story of Prometheus; Popular Science Monthly, Vol. X., p. 17, on "The Fire Worshipers;" Scientific American Supplement, Vol. 64, p. 395, on "Oil Fields of the United States."

METHODS OF COOKING.

The objects of cooking food are to make it more digestible, to improve its flavor and appearance and to destroy disease germs. The heat in such foods as are served hot aids digestion. Cooking is also of value for the reason that articles of different flavor may be combined, thus giving a pleasing variety to the diet. Most foods if served in the same way, day after day, soon become tiresome; then the appetite is lessened, and the digestive organs are not well stimulated. In case the market, or one's purse, or one's health, allows only a small choice of foods, these may often be made palatable by variety in

the manner of cooking.

Among the different classes of foods, those of animal orgin are more generally used in the cooked form—at least by civilized nations—than those of vegetable origin. Most fruits and some vegetables are best in flavor when served raw. Uncooked meat is, as a rule, not only displeasing, but may be actually unwholesome.

The various methods of cooking are boiling, stewing, steaming, roasting, broiling, panning, sauteing, frying, baking, and braizing.

Of these, the three main processes, roasting, baking and boiling, have been known through long ages. Before the discovery of fire, however, primitive man lived on uncooked fruits, nuts and herbs, and even on raw meat. (The word Eskimo, for example, means "raw flesh eaters.")

Roasting seems to have been the method of cooking first used by the early peoples. The bit of fish or meat was fastened on the pointed end of a stake, which was planted standingly over the fire. (Here we find the derivation of our word beefsteak.) For larger roasts, there were set up two supports,—tree limbs forked at the top—across which a pole was laid. When the meat had been attached to this, and a fire built beneath, the arrangement was complete.

The baking of fish or meat was done by wrapping the food in harmless leaves—banana leaves being so-used still in Hawaii and Africa—and then placing it in a slow fire. Another method, the packing of food in damp clay before cooking in hot embers, had features in common with our modern oven-baking. Again, pits lined with stones, heated, on which were laid the food to be cooked, formed a sort of underground oven.

Cooking by means of boiling water showed that the people had gained a greater control over the elements, and thus had reached a higher stage of development. Nevertheless primitive woman had no cooking utensils, so she chose from a stream a rock well hollowed out or, taking a log of wood, she burned out a large cavity by means of fire-brands or, again, she made a water-tight basket, or she dug a hole in the ground, and lined it with rawhide. Into

any one of these, she poured water, and then heated it by dropping in hot stones. This odd method, called "stone-boiling," is still used in certain parts of Europe when making "stone-beer."

BOILING.

Boiling is cooking by direct contact with boiling water or other liquid. This method is used for large cuts of meat, or large articles in general, such as ham, corned beef, cabbage, etc.

When meat is to be boiled, it should be placed in a sauce pan of boiling water. The utensil needs to be covered, so that the water may quickly come to a boil again. It should then boil for five minutes in order to coagulate the outside of the meat. Thus, most of the juices are sealed within. Thenn tnhe meat should be simmered until tender. ("Boiled" meat is best when not actually boiled.) Certain articles are boiled rapidly during the entire time of cooking. Rice and macaroni are treated in this way for the purpose of keeping the particles separate. Cabbage, cauliflower and onions are found to be of milder flavor if the water is kept boiling. The probable reason is that the intense heat drives off much of the volatile oil to which their flavor and odor are due.

In boiling meat, salt should be added when the cooking is about half finished. If added before it toughens the meat. Most vegetables are salted when put on to cook. Certain foods—onions in particular—lose much flavor if not salted at the beginning. No salt should ever be added to the water for cooking beets, else their coloring matter is drawn out.

Most articles are boiled in a covered utensil, because less heat and flavor escape than from an open vessel. The lid is left off cabbage, and similar articles, so that their strong odor may pass away quickly. Also, such vegetables, when cooked uncovered, have a whiter color, and milder flavor. Spinach, peas and other green vegetables seem to retain their color better if cooked without a lid.

Even when articles are carefuly boiled, some of their juice escapes into the water. This is nearly always fit to use in soups or sauces, and should be saved for such purposes.

STEWING.

Stewing is cooking in boiling water or other liquid, and is applied to small articles in general. Large cuts of meat are divided into pieces convenient for serving.

In stewing either meat, fruit, or vegetables, a small amount of liquid is used. It varies from one-fourth to one-half the bulk of the food. The smaller amount is used with naturally watery foods or those which cook quickly, and the larger amount with dry foods, or those needing considerable time for cooking.

In this method, as in boiling, the water or other liquid is brought to boiling point at first, and after five minutes the heat is lessened, so that the food may cook slowly. By this means, the fibres of meat are softened, and the coarser, tougher portions may be made tender and palatable.

Since there is only a small amount of liquid on stewed articles, it is served as a sauce with the article. Generally, flour, cornstarch, or yolk of egg are added to thicken the sauce. For stewed fruits, which have been cooked with sugar, the liquid is in most cases boiled rapidly for a few moments after removing the fruit, in order to form a slightly thick syrup.

Pot pie is merely a meat stew to which pie crust or biscuit dough is added.

STEAMING.

Steaming is cooking by heat of steam in a closed utensil called a steamer. Boiling water is poured into the bottom of the vessel, and kept at boiling point during the entire cooking. Above the water are perforated shelves. On these the food is placed. Several kinds may be cooked at once. The heat of the steam which passes through the holes in the shelves, reaches all parts of the utensil, and causes a slow, gentle cooking. By this means, tough meat becomes tender. However, meat can not brown in a steamer, nor does it have the rich flavor of roasted meat.

Delicate puddings, and vegetables which lose flavor when boiled in water, are best cooked in a steamer.

This method is economical of top stove space, as an entire meal may be cooked in the steamer. Also, with a gas, gasoline or kerosene stove, fuel is saved, because only one burner needs to be used.

A variation upon steaming is the use of the double boiler. This consists of two boilers, one fitting into the other. Boiling water is poured into the lower boiler. In the upper boiler is placed the article to be cooked. Boiling water or other liquid needs to be added to the food. Hence, it is cooked by the heat of this liquid. But the boiling water in the lower utensil really provides the heat. It should always be kept about one-third full of water, or with enough that the bottom of the inside boiler touches the water. When cooking any food that requires much time, it may be necessary to add more water occasionally to that in the lower boiler. It must never be let cook dry, as intense heat ruins the utensil, and also allows the food in the upper boiler to scorch.

For the sake of economy, it is well to use a double boiler for any cereals needing long cooking. The food cooks evenly, and none remains sticking to the boiler. When cereals are put in an ordinary saucepan directly over the fire, there is always some waste, a more or less thick layer of the food clinging to the bottom of the saucepan. Thus there is a waste of money, and of time and strength in cleaning the utensil.

The double boiler is especially useful for heating milk, and for making delicate puddings containing eggs. The preparation of food in a fireless cooker is in a way similar to steaming. The cooker, a box-like arrangement, holds utensils in which foods are placed. About the utensils is packed closely some material through which heat can not readily escape. The food to be cooked is first placed on the stove, and heated, usually being boiled for a short time. It is then transferred to the fireless cooker, whose lid should at once be securely fastened. Thus the food retains its heat for hours, and cooks gradually. It always needs a much longer time for cooking than when put on the stove in the usual way. A small ham may be boiled for a half-hour during the late afternoon, and then be placed in the cooker, from which it may be taken, sufficiently done, the following morning. The fireless cooker not only saves fuel, but is especially convenient for use in summer, when one does not wish heat in the kitchen.

ROASTING.

Roasting is cooking by heat radiated directly from a fire. This method, when used out-of-doors, for cooking an entire animal takes the name of barbecue.

For household roasting there is needed a large utensil sometimes called a tin-kitchen, or a Dutch oven. This contains metal rods, on which meat is hung, and placed before an open fire. The meat needs to be basted and turned occasionally during the cooking. Sometimes the turning is done by machinery. In olden times, when meat was commonly cooked in this way in the huge open fire-places, the dog of the household was often trained to turn the spit, or rod, holding the meat.

Although roasting gives meat a finer flavor than any other method of cooking, a true roast is seldom seen nowadays. We do not have, as a rule, a suitable kind of fire, the tin kitchen is a large utensil, taking up much space in the kitchen and difficult to clean, and the meat, in cooking requires much attention. At present, we generally apply the term roasted meat to that which has been baked in the oven.

POT ROASTING.

This name is commonly given to an old-fashioned way of cooking meat in a cast iron pot placed on top of the stove. The pot needs to be made very hot, then the meat—generally a thick, lean cut—is put in, and turned several times until brown on all sides. A small amount of boiling water is poured around the meat, which is then allowed to cook very slowly until tender. By this method, the meat has the well-browned appearance of a roast—hence its name.

BROILING.

Broiling and roasting are in reality the same method of cooking. But broiling, or grilling, is the term used when preparing small cuts of meat, fish, poultry, or small articles in general. Broiling may be done on any cook stove. There is needed a good body of fire, burning brightly. The fire must be almost to the top of the fire-box. The oven damper should be set so that smoke and odors may pass directly up the chimney. The meat or other article to be cooked is placed on a double broiler, after the bars have

been greased with a piece of fat from the meat, or with fat pork. It is then held directly over the open fire, and turned every two minutes until brown, and cooked as much as desired. A beefsteak from 1 1-2 to 2 inches thick will cook rare in about 10 to 12 minutes. Mutton and lamb chops require 6 to 8 minutes.

In case the fat drips from the meat while cooking, and catches fire, the broiler should not be lifted, as the flame does not harm the meat, while smoke would blacken it.

Seasoning should be added when the cooking is finished.

Broiled meat should be served as quickly as possible after cooking, in order that its fine flavor may not escape.

Tender cuts of meat are the only ones suitable for broiling.

PANNING.

Panning is cooking by direct contact with a hot pan. Other names given to it are dry panning or pan broiling.

This method may be used when it is not convenient to open the top of the stove for broiling. It is seldom applied to articles other than steak, chops, ham, bacon, or oysters.

A sheet iron pan is heated until smoking, or "blue" hot, when the meat is put in and let cook until it will loosen easily from the pan. It then needs to be turned, and the turning should be continued every two minutes until the meat is done.

Foods cooked in this way have almost as fine a flavor as when broiled. Panned beefsteak is much more wholesome than "fried" steak.

Very lean or tough meat can not be cooked satisfactorily by panning.

SAUTEING.

Sauteing, or wet panning is cooking in a small quantity of grease. (This method is commonly, but incorrectly, called "frying.")

The grease should be put into a pan, using only enough that when melted will cover the bottom of the pan. The grease needs to be heated until smoking, then the food is laid in, and let cook until brown on one side, when

it is turned so that the other side browns. Articles should never be turned more than once, as frequent turning causes them to become grease-soaked.

This method of cooking, even when carefully done, is not very wholesome. Because of the intense heat, the fat sometimes causes indigestion or heartburn.

FRYING.

Frying is cooking in fat deep enough to entirely cover the food.

From the viewpoint of hygiene, the least objectionable fat for frying is vegetable oil. If olive oil seems too expensive, the cheaper cottonseed or peanut oil will give results fairly pleasing in color and flavor. There are on the market satisfactory mixtures of cottonseed oil and beef suet.

When animal fat is used solely, one-third beef suet and two-thirds lard forms a mixture which answers well. In case lard alone is chosen, care should be taken to have it of good quality. Poor lard is unwholesome and has an unpleasant odor and flavor which are still further developed by heating.

Most articles, before being fried, are dipped into batter, or into egg and then coated with bread crumbs. The albumen of egg, being coagulated by the heat of frying, prevents the grease from soaking into the article. When the article itself is any soft mixture, the egg keeps the mixture from cooking out into the fat.

The grease for frying should not be boiling hot, as often directed. It sometimes happens that bubbles appear, and the grease then seems to be boiling. But these bubbles show that the fat contains water. (Lard may hold as much as thirty per cent of water.) Since water lowers the temperature of the grease, it is not ready for frying until the bubbles cook out, and the surface becomes quiet. Usually the fat should be so hot that it begins to smoke. The temperature may be tested by dropping in a bit of bread. If it browns almost at once—in about 40 seconds—the fat is hot enough for frying oysters or other foods needing quick cooking. For batters and most articles requiring slow cooking, the grease should be hot enough to brown a piece of bread in one minute.

A wire basket with side handle is the most convenient utensil for holding articles to be fried. In case this is not at hand, a flat, spoon-shaped wire egg beater, or a large, long handled meat fork may be used to hold the articles while frying. Those which float—such as doughnuts—while not needing support, will require turning.

As soon as done, each article should be placed on soft paper to drain free of grease.

When the frying is finished, the fat should be taken from the stove at once, and strained through cheesecloth or a gauze-wire sieve. When cared for in this way, it may be used many times.

BAKING.

Baking is cooking by heat radiated from an oven.

A slow oven has a temperature of 270° to 350° F., a moderate oven 350° to 400°, a quick oven 400° to 480° F.

The heat of the oven may be tested in several ways. One may use a thermometer, but these are not always accurate. Some makes of ranges have a thermometer set in the oven door.

The heat may be tested with white paper. If a piece laid on the rack turns a pale yellow in 5 minutes, the oven is ready for any foods that need slow cooking, such as angel cake, or sponge cake. Should the paper color a deep yellow, or quite pale brown in 5 minutes, the oven is hot enough for bread, and other articles requiring medium heat. If the paper becomes a deep brown in 5 minutes, the heat is great enough for meat, biscuit and other foods needing either intense heat at first, or quick cooking.

The oven heat may also be tested by scattering flour over the bottom of the oven, judging by the color, as with paper. This method is more trouble, and less cleanly than the paper test.

One may judge of ordinary heat by holding the hand in the oven until one counts twenty slowly. If the air feels so hot that by the end of the counting the hand must be withdrawn, the oven is about right for bread and other ordinary cooking.

For baking meat, the oven should be very hot—about 400° F.—for 15 minutes after the meat is put in. (This is for the purpose of coagulating the outside of the

meat, so that the juice can not escape.) Then the oven should be cooled somewhat, thus letting the meat cook rather slowly until tender.

It is best to bake or "roast" meat without any water in the pan, whenever possible. This may be done with quite fat meat. If the meat is lean and dry, suet should be cut into bits, and scattered over the top.

Meat should be basted every 15 minutes. (Basting consists in dipping up from the pan portions of the melted fat, and pouring over the meat.) This helps the meat to brown, but keeps the outer part tender and prevents the escape of juices.

To bake beef rare requires 15 minutes to each pound and 15 minutes over. This extra fifteen minutes is allowed as the time needed for the meat to heat through and begin cooking. Thus, a 4-lb. roast of beef should be given 1 1-4 hours for cooking. Well-done beef needs 20 minutes to each pound. For mutton, well-done 15 minutes are given for each pound. Veal, which should always be well done, needs 25 minutes to the pound. Any large, thick roast of pork requires 30 minutes for each pound. A thin cut of pork, such as spare-rib, may cook well-done with 20 minutes for each pound. Chicken, of about three pounds weight, should be given a total time of about 1 1-2 hours. A ten-pound turkey will cook in about 3 hours.

Seasoning should be added to baked meat when it is half-done.

When baking bread, the oven should be kept hot at first for about 15 minutes, or until the bread begins to brown slightly. Then the oven should be cooled, so that the bread may bake slowly. If the oven were kept very hot during the entire time, the outer part of the loaf would be too brown before the centre were cooked. It is necessary to have bread thoroughly baked, in order to cook the starch, and to destroy the life of the yeast. (Slack-baked bread often causes indigestion; and if such bread be kept for several days, it is likely to grow sour or mouldy.)

The time given for baking bread, a single loaf to a pan about 4x9 inches in size, is 45 minutes. When larger pans must be used, 15 minutes extra time is allowed for

each additional loaf. Thus, two loaves to a pan would need 60 minutes for baking, while three loaves in one pan should have 75 minutes. (1 1-4 hours.)

Articles raised with yeast, baking powder, or similar mixtures should be placed on the bottom of the oven, so that the under heat may cause them to "puff up" or become light. Meat is generally set on a rack near the bottom of the oven.

Articles which require browning on top, but very little cooking throughout should be placed on a rack near the top of the oven. Custards and other delicate foods containing eggs need to be set in a pan, and to have a little hot water poured around them. The water keeps them from cooking too much in the bottom, before the rest of the mixture is done. Such foods are usually set on the middle rack of the oven.

BRAIZING.

Braizing, as a method of cooking, has some features from several other methods. The utensil used is called a braizing pan. In the bottom of this are placed several kinds of vegetables, and some boiling water. The meat to be cooked is laid on the vegetables. Over all a tight-fitting cover is placed. The pan then being set in the oven allows the meat to cook partly by direct contact with the water, in part by steam, and also by heat from the top of the pan.

This method is used, as a rule, only for large cuts of meat.

A covered earthen dish, called a casserole, is much used abroad, and sometimes in our country, for cooking small articles in a way similar to braizing.

Readings: Home Life in All Lands (Morris), pp. 188-231; Woman's Share in Primitive Culture (Mason), pp. 30-40, 90-113, 144-145.

CARE OF FOOD.

Food supplies should be protected from impure air, dust and dampness. As a rule, they also need to be kept cool. The heated air of the kitchen soon injures various articles. It is very important that food be protected against flies, as they are carriers of many diseases, typhoid, perhaps, in particular.

For the storing of dry groceries, bought in small amounts, such as rice, raisins, etc., glass jars or wide-mouthed bottles are best. These may be kept air-tight, they are not difficult to clean, and they allow the contents to be easily seen.

As certain volatile oils give the chief flavor to pepper and other spices, such articles should not be left in paper packets after opening. It is well to have at hand a supply of small bottles into which the spices may be emptied. Many of the higher grades of spices come in tin boxes, which, being air-tight, are quite satisafctory. Since but few of such articles are in frequent use, it is best to buy them only in small quantities. Even with care they lose their strength in time, besides being occasionally attacked by insects.

Extracts lose flavor readily if left open. They should be uncorked only as needed and closed again at once. Since corks have a habit of breaking, it is well to wash and save any good ones when casting away bottles. Also, a small collection of well-cleaned empty bottles in various sizes often proves a convenience.

Baking powder, cream of tartar and bicarbonate of soda need to be kept air-tight.

Flour may be stored in a tin flour bin, a firkin or a barrel. It needs a dry, moderately warm place. In case large quantities are used, so that the flour is bought by the barrel, it is often well to raise the barrel a few inches off the floor by setting it on cleats. This prevents dampness from striking into the barrel underneath.

Cornmeal spoils more quickly than most other cereals. It should be kept cool and as dry as possible. In the early fall, when the new grinding of cornmeal is placed on the market, it is well to buy it in only small amounts. Later, when the meal has become well dried, larger quantities may be stored with less danger of its spoiling.

As weevils readily attack cornstarch, it should be kept in a closely covered jar.

Crackers and similar foods which are desired crisp need to be stored in a dry and moderately warm place. They must be kept air-tight.

Bread, loaf cakes, and other like foods which are preferred moist should be stored in tin boxes. However, stone crocks prove better when such preparations are to be kept for a lengthy time. In certain cases, it may be well to follow the confectioner's method, and place a wet sponge (set in a jar or tumbler) in the crock with the bread or cake. This prevents drying.

For sugar there should be large covered crocks or wooden firkins. Sugar, salt and other articles likely to absorb moisture should never be stored in tin receptacles.

All fatty and oily foods should be kept cool. In time, if exposed to heat, they turn rancid. Butter is very quickly affected in this way. Most fats absorb odors readily. Hence butter, cream and olive oil, whose natural flavor is delicate and easily spoiled, should be kept away from articles having a strong odor, such as onions, cabbage, melons, etc. It is well to put butter in a covered crock. Olive oil needs to be well corked, and to be set in a place that is both dark and cool. Families using much olive oil will find it an economy to buy the oil in tin cans rather than in bottles. The tin is of advantage also, in preventing access of light. Nuts need to be kept dry as well as cool.

Nearly all fresh fruits keep best and are thought to have their finest flavor when chilled. Bananas, however, if intended for serving whole, should be kept in a cool place, but not in the refrigerator. It is found that after being in a refrigerator their skins soon turn dark on exposure to the warmer outside air. Cantaloupes need to have the rind well scrubbed and wiped dry. They should be laid at the lowest part of the refrigerator, when in a few hours, they will become sufficiently cold. Thus treated, they are of a finer flavor than if chilled by lumps of ice placed in them.

Dried currants, although usually called "ready-cleaned," are seldom above suspicion. If they taste in the least sandy, it is well to wash them through several waters, each time lifting them from the soiled water to the fresh. In case the water is merely drained off, it proves difficult to free them from sand. When clean, they should be spread out on a large platter, and dried slowly in a warming oven or a very cool baking oven. They may be placed in a glass

jar, and are ready for use at any time. This is a better plan than to wait until the fruit is needed, and then wash it. In the latter case the fruit will be damp and heavy and will probably sink to the bottom of most mixtures to which it may be added.

One should select a cool, dark and dry place for the storing of canned fruits and vegetables.

Food materials containing much proteid, especially when in a moist state, are likely to spoil quickly. Hence milk, eggs, fish, poultry and meat need especial care if they are to remain in good condition.

Cooked food of any kind should be cooled before it is placed in the refrigerator. If set in while warm, it melts the ice, gathers moisture on the outside, and absorbs odors from other foods. It may also cause the spoiling of foods placed near it. Particular care must be taken when putting away meat that has been cooked in water. It is thought that boiled ham, corned beef and smoked tongue are more moist, and have better flavor if cooled in the water in which they were cooked. This method may be used during cold weather. It is a decided risk in warm weather, even though such meats contain considerable salt, which acts as a preservative. Fresh meats are almost certain to spoil under such treatment. They should be taken from the liquid as soon as cooked. Then it is wise to let both the meat and the liquid be uncovered, so that they may cool quickly. When the liquid is intended for making soup, the vegetables used for flavoring or garnishing should be added as late as possible. After vegetables have been cooked in soup stock, it turns sour quickly, especially in warm weather.

All receptacles for foods should be kept clean. Bread and cake boxes in particular need frequent scalding, after which it is well to dry them thoroughly in the sun. Stale or moldy bits of bread or cake should never be allowed to collect. Stale bread may be used in scalloped dishes, as a stuffing for meats, in griddle cakes, etc.

Neat housekeeping requires that food supplies be taken out of paper sacks as soon as received, because the bags tear easily, and cause the pantry to have an untidy appearance. Any bags that are clean should be folded and laid

away for various uses. Heavy ones may be slipped over the hand and used in rubbing grease and dust from the top of the stove, with or without blacking. They may be placed over jars of canned fruit from which one wishes to exclude the light. Stiff pasteboard boxes that held crackers may be flattened out, and the sections used for scraping greasy dishes.

If small portions of food are left over from a meal, instead of wasting them, or serving them again in the same way, one should try to make some different dish from them. This affords both economy and variety to the diet. By paying attention to such small matters, the French have become noted as both good and economical cooks. Foreigners say that Americans in general spend more on their tables, and have less to show for the outlay than any other nation. Let us hope that a knowledge of domestic science will finally correct this fault.

A FEW GENERAL SUGGESTIONS.

STALE BREAD. BREAD CRUMBS.

The economical housekeeper takes care daily of any remains of bread. Entire slices may be used for toast or croutons, while the uses of crumbs are numerous.

There is a difference between stale and dried bread crumbs.

Stale bread crumbs are obtained from bread about two days old. If only the center is desired, this may be torn out with a fork, and then crumbled by a light rubbing between the hands. Stale bread crumbs should be left in loose flakes—not powdered fine. In case the crust is only lightly browned so that it does to use as well as the centre, the crumbs may be made by rubbing the entire loaf over a coarse grater. It is best to prepare stale bread crumbs just before needed for use. Being somewhat moist, they soon grow moldy if stored away.

Stale bread crumbs are used mainly for the stuffing of **poultry, veal or fish; for omelets,** griddle cakes, scalloped dishes; also, in bread pudding and suet pudding.

When only the center of a loaf has been used for stale crumbs, the crust may be saved for making dried crumbs. Should any part of the crust have been baked

very dark, this needs to be trimmed off. The parts fit for use are to be put in a pan which is then set into the warming oven until the bread grows dry and crisp, or, the drying may be done in the baking oven, at a time when the fire is low. The oven door would best be left open, as the bread should dry without browning.

After the pieces are crisp they may be spread on a board, crushed with a rolling pin, and sifted afterward. A quicker and more convenient method is to put the bits of bread through a meat grinder. Thus the crumbs are of an even size, and do not need sifting. When entirely cool if put into a jar, and closely covered, they will keep well for several weeks.

Dried bread crumbs are used mostly for coating articles that need to be dipped in egg and crumbs.

For this purpose, bread crumbs have advantages over cracker crumbs. The latter do not brown evenly on croquettes or similar articles. Besides, cracker crumbs contain more fat than bread crumbs and are, for this reason, less wholesome when heated to a high temperature, as in frying.

Stale rolls, biscuit and even entire loaves of bread may be freshened by re-heating. Dip each article, separately, into cold water. They must be merely moistened, not dripping wet. Place them in a pan, cover with another pan, and put into a brisk oven for about 10 minutes. When the crust is hot and dry they are ready to use.

CARAMEL.

Put 1 cup granulated sugar into an iron skillet and place over a slow fire. Stir occasionally—using a wooden spoon—until all of the sugar has melted. It should become a pale brown—about the color of table syrup—if intended for use as a sauce or for flavoring and sweetening ice cream or other desserts. If wished for coloring soups and meat sauces, let it cook until it begins to smoke and turns a dark brown. The sweetness then disappears. In either instance, as soon as it reaches the color desired, pour in one cup of boiling water, and let cook one minute. Cool, turn into a bottle and cork well. It may be kept a long time.

CHOCOLATE.

It is usually a waste of time and strength to either grate chocolate or to shave it into bits. If the quantity needed be put into a small saucepan or cup, and this placed in a pan of warm water on the back of the stove, the chocolate will melt very soon, and is then ready for adding to any mixture that is to be cooked. This melted chocolate will not do for putting into cold dishes unless it is first boiled in a little water.

All half-pound cakes of bitter chocolate are made with creases on top which mark off squares of one ounce each. A single square when grated makes six level tablespoons of chocolate. By keeping this proportion in mind, when a receipt calls for a certain amount of grated chocolate, one may make work easier by cutting off the needed portion and melting it.

TO CLARIFY FAT.

The trimmings from fresh meat, the drippings from roasts, and the skimmings from soup stock should all be saved. Cut the pieces of fat into half-inch bits. Put these and any other grease to be clarified into a saucepan and set over a slow fire until all is melted. Then strain through a fine cheesecloth and measure. To every four cups of the grease add one and one-half cups of boiling water, and a scant quarter of a teaspoonful of bicarbonate of soda. (The soda is used to remove any unpleasant odor or taste, while the water aids in this work by driving off impurities in steam.) Place the mixture over a moderate fire and boil until the water has evaporated. (This is shown by the surface becoming still—bubbles no longer appearing.) Strain through a double thickness of cheesecloth, and set away to cool.

CROUTONS.

Slice stale bread into pieces one-half inch thick. Butter lightly, then cut into half-inch blocks. Place them, buttered side up, on a shallow pan or pie plate and set in a moderate oven. Brown lightly. Serve with soup.

CUSTARDS.

In making a soft custard sauce, or any similar dish thickened with eggs, if it should be cooked a moment too long, so that there are signs of curdling, the mixture

should be turned out at once into some cold utensil. If then beaten briskly with an egg beater for a short time, it will generally become smooth.

EGGS.

In separating the yolk from the white of an egg, especial care is needed that none of the yolk mixes with the white. A little white does no harm to the yolk, but even a small speck of yolk will prevent the white from becoming light when beaten.

When several eggs are to be used in any recipe, each one should be broken over a separate dish, and examined before being added to the others.

TO SCALE AND CLEAN FISH.

Hold the fish by the tail, and with a small sharp knife scrape from the tail to the head, being particularly careful to remove scales near the fins. Even when the fish has been scaled by the dealer, this point needs attention. If the head is to be removed, cut it off back of the fin that is near the gills. Then begin at the head, split the fish halfway along the lower part of the body. Remove the entrails, being careful not to break the gall sac, and scrape all the blood from the backbone. When fish are to be broiled, whole, they are split along the backbone the entire length of the fish. Fish for baking or boiling whole usually have the head and tail left on. The fins should be cut off, and the tail trimmed in a straight line across.

TO BONE A FISH.

Scale and clean the fish. Cut off the head. Lay the fish on its side on a board, having the head portion away from you, and the backbone toward the right hand. With a sharp knife make a cut through the skin the entire length of the fish and immediately above the dorsal fin. Hold the edge of the knife flat, and close to the backbone. Cut from the head toward the tail, removing the flesh from the upper side in one piece, then turn the fish with the bone to the board. Remove the flesh from the other side in the same way. If properly done, the backbone and fins will remain in one piece, but with scarcely any flesh on them. The two long strips of meat are called fillets. If

from small fish, these are cooked whole. Large fish are divided into smaller portions. Frying is the method of cooking usually applied to fillets.

GREASING PANS, ETC.

For greasing pans, a small flat brush or bit of paper may be used. Griddles need to be greased evenly, and this is best done with a patent greaser, or with a piece of fat pork or suet held on a fork.

Butter should never be used for greasing, as it is too expensive. Also, the salt in it causes articles to stick, and the casein is likely to burn.

KNIVES.

Dull knives waste time and material and destroy the cook's peace of mind. A steel knife sharpener is one of the most important utensils about a kitchen. To sharpen a knife: Place the edge of the knife against the steel, at an angle of thirty degrees. (At a smaller angle, the edge scarcely touches the steel. At a larger angle, the edge is dulled.) Draw the blade its full length, from heel to tip, against the steel, pressing lightly. Then the other side is to be treated in the same way. By changing thus, from one side to the other, several times, the knife soon becomes sharp.

To slice cake. In cutting any delicate or rather fresh cake, avoid holding the knife in the usual horizontal position. Instead, place it point downward in the cake, in an almost perpendicular position, giving short quick cuts, much like a sawing motion. By this means, the slices will neither be torn nor crushed.

ONIONS.

When needing onion juice it is best to select white-skinned onions, as they contain more juice than those having red skin. The onion, after peeling, should be cut into halves crosswise. If the cut is then pressed, or slightly torn, against a coarse grater, the juice flows—slowly, but in general, surely. Onion juice, being milder than grated or chopped onion, is best suited to dishes of delicate flavor.

To Chop Onions. Peel the onion, and place it, root side down, on a board. Using a sharp knife, make parallel cuts down through the bulb almost to its base. Then, in the same manner, make cuts at right angles to these. The

entire top surface, and the onion throughout, is thus marked off in tiny squares. Now, turn the onion on its side and slice across. This method gives pieces as small as one wishes, and without the time and trouble needed for chopping in the old style way.

The odor from onions may be removed from the breath by drinking a little strong coffee, or by chewing a bit of parsley.

PARSLEY.

To Chop Parsley. Wash the parsley, and dry by patting it in a towel. Arrange the leaves together, and twist them into a compact bunch. Hold this tight between the thumb and two fingers of the left hand, letting the end of the bunch reach just to the tips of the fingers. By placing the parsley against a board, and resting the flat part of a knife blade against the ends of the fingers, the parsley may be sliced fine enough to need no chopping afterward.

Parsley loses both flavor and color by long cooking. When to be used finely chopped, as a garnish for soups, or similar dishes, it should be added only a moment before taking the article from the fire.

WAYS OF COMBINING INGREDIENTS

There are three ways of combining ingredients: Stirring, beating and folding. Those which are to be blended by stirring are usually placed in a bowl or saucepan, a spoon being used for mixing. Stir around and around, in gradually widening circles, occasionally scraping the sides and keeping the bowl of the spoon against the bottom and sides of the bowl. The stirring should be slow at first to avoid spattering. When making a sauce, brisk stirring is needed as soon as it begins to boil. This ensures smoothness.

A mixture is beaten to break up its substance, and make it smooth or fine-grainend, or to beat in the air and make it light. The spoon or the beater should be lifted from the bottom to the top of the mixture at each stroke. In this way, some air is entangled in the egg, batter or other substance. (Beating should be done rapidly.)

When two or more articles are to be folded together, the lighter material, such as white of egg, is usually placed on top. The bowl of the mixing spoon is then sunk to

the bottom of the mixture, and a portion of the heavier material is lifted up at each stroke, and gently turned over the lighter part, thus combining until the blending is complete. This method is employed when one wishes to prevent the escape of air which has previously been beaten into the mixture.

ABBREVIATIONS.

t. stands for teaspoonful.
T. stands for tablespoonful.
c. stands for cupful.
pt. stands for pint.
qt. stands for quart.
pk. stands for peck.
gal. stands for gallon.
oz. stands for ounce.
lb. stands for pound.
min. stands for minute.
hr. stands for hour.

TABLE OF MEASURES.

3 t. equal 1 T.
16 level or 8 rounded T. equal 1 c.
2 gills equal 1 c.
2 c. equal 1 pt.
4 c. equal 1 qt.
4 qts. equal 1 gal.
8 qts. equal 1 pk.
2 gal. equal 1 pk.
2 T. butter equal 1 oz.
2 T. granulated sugar equal 1 oz.
4 T. flour equal 1 oz.
2 c. butter, packed solid, equal 1 lb.
2 c. granulated sugar equal 1 lb.
2 1-3 c. pulverized sugar equal 1 lb.
2 c. finely chopped meat, packed solid, equal 1 lb.
4 c. flour equal 1 lb.
9 or 10 eggs equal 1 lb.
4 c. pulverized coffee equal 1 lb.

RULES FOR MEASURING.

In this book, all measurements, whether made by teaspoon, tablespoon or cup, are level.

Articles, such as salt, pulverized sugar, etc., which readily form into lumps, should be rolled or sifted before measuring.

The standard measuring cup holds a half-pint, dry measure.

A cupful is measured up to the brim (without shaking or packing down) and stroked off level. The cup should not be dipped into the material. Both exactness in measuring and neatness require that a scoop or spoon be used in filling the cup.

To obtain a spoonful, fill the spoon by dipping it into the article needed. Then hold a case-knife with the blade perpendicular and level off the article even with the edge of the spoon. (Never place the blade of the knife flat on top of the material in the spoon. This packs the particles and makes too large a measurement.)

A spoonful of butter melted is measured before melting. A spoonful of melted butter is measured after melting.

To obtain half of a spoonful, divide the entire spoonful through the center lengthwise.

A quarter of a spoonful is measured by dividing the half spoonful in two parts crosswise.

To secure good results in cooking, all measurements and weights must be exact.

Before beginning any cooking, fix the fire in the proper order, and do not forget that it may need further attention later.

Collect utensils, and measure ingredients.

Be careful not to waste material by scattering flour, sugar, etc., on the table or the floor. Nor is there need of sprinkling flour over yourself, so that you look like "a dusty miller."

Do not let eggshells, potato parings, or other refuse gather as you work. Collect soiled dishes as soon as possible and wash them at the earliest spare moment.

When cooking, keep yourself as neat as at other times, or even neater. Many persons, while preparing meals, or doing other kitchen work wear a dark colored apron, because it "does not show dirt." It is better to wear an apron of very pale color, or white (plainly made) because it DOES show dirt. One thus learns to work neatly.

Cooking, when properly done, is clean work. Always have at hand a holder or old towel for opening the oven door, or for lifting utensils about the stove. Never use the corner of your apron for such purposes. Nor should the hands ever be wiped on the apron. Before beginning to cook, wash the hands well with soap and hot water, and then KEEP them clean. Never apply grease to cake pans with the fingers. Do not use the finger for cleaning out batter from a mixing bowl. A spoon or a thin bladed knife answers this purpose well. When blending materials in a bowl, be careful not to spatter them up to the rim. There should be a clean edge by which to hold the bowl. There is no need for making the handles of knives and spoons sticky while working.

Whenever you find a recipe to your liking, always follow it exactly, and there will be no need for tasting it during the cooking to know whether it is "right." Do not form the habit of eating the bit that clings to the spoon when turning out articles for serving. Frequent nibbling harms the complexion and the digestive tract. When it is really necessary to taste an article, use a clean fork or spoon, and do not dip it into the food a second time. Such a method not only looks unpleasant, but may do positive harm.

CEREALS.

OATMEAL MUSH.

1-2 c. oatmeal. 2 c. boiling water.

1-2 t. salt.

Pick over the oatmeal. Put into a double boiler. Add the salt and boiling water. Stir until mixed, then cook 1 1-2 hours without stirring. Be careful that the lower boiler contains sufficient water during the entire time. If rolled oats are used, take only 1 c. boiling water.

CORNMEAL MUSH.

Use the same proportions as for oatmeal mush and cook similarly. It has a better flavor when cooked in an ordinary cast iron boiler, but some of the mush is wasted by sticking to the bottom.

GRANULATED HOMINY.

2-3 c. granulated hominy. 2 c. milk.

1-2 t. salt.

Soak the hominy in 1 1-2 c. cold water over night. When ready to cook, drain off any surplus water. Put the ingredients into a double boiler and cook 1 hour.

BOILED RICE.

1 qt. boiling water. 1-2 c. rice.
1-2 t. salt.

Pick over the rice. Wash it thoroughly and drain. Put the boiling water and salt into a saucepan. Sprinkle in the rice and stir over a brisk fire until the water again comes to a boil. Let the rice cook rapidly until tender. Drain. Stand the saucepan on the back part of the stove and cover with a towel. Let the rice steam thus for 10 minutes, when every grain should be distinct. If the rice be desired softer, like mush, add to it 1 c. hot milk immediately after draining off the water, and simmer for 5 minutes.

CREAM OF WHEAT.

1-2 c. cream of wheat. 2 c. boiling water.
1-2 t. salt.

Put the boiling water into a saucepan and set it over the fire. When the water begins to boil, sprinkle in the cream of wheat, slowly, stirring constantly. Add the salt. Then set the saucepan where the cereal can simmer for 10 minutes.

Cream of wheat may be made in a double boiler, but needs 20 minutes cooking.

TOAST.

DRY TOAST.

Select bread two days old. Cut into slices 1-3 inch thick. Hold them over a clear, hot fire, turning occasionally until a pale brown. Spread lightly with butter and serve at once.

MILK TOAST.

4 medium-sized slices of dry toast. 1 1-2 T. butter.
1 c. milk. 1-2 t. salt.

Put the milk into a shallow saucepan to scald. Then add the butter and salt. When the butter is melted, put in the toast and let each slice become soft but not broken. Place in a heated dish. If any milk remains in the pan pour it over the toast. Put a lid on the dish and serve hot.

WATER TOAST.

Water toast is made in the same way as Milk Toast, using boiling water in place of milk.

FRUIT TOAST.

4 small slices dry toast, buttered.

4 T. sugar.
3 t. cornstarch.
1-2 c. fruit cut small.
1-2 c. fruit juice.

After making the toast keep it warm while preparing the fruit. Bring the juice to a boil; add the sugar and corntsarch, which have been well mixed, and stir until boiled and clear. Add the fruit, and as soon as it is steaming hot, pour it out on the toast, which has been buttered just before using.

GERMAN TOAST.

8 small slices bread.
1 c. milk.
1 egg.
1-2 t. salt.

Beat the egg, add to it the milk and salt, pour the mixture out on a platter, and soak the bread in it, turning occasionally until the liquid is entirely absorbed. Then brown on both sides on a greased griddle. When done, the toast may be sprinkled with sugar, if desired.

POTATOES.

BAKED POTATOES.

Select potatoes of uniform and medium size. Scrub them thoroughly and wipe dry. Place them in a baking pan, and put into a hot oven until tender, from 30 to 40 minutes. Serve at once.

BOILED POTATOES.

Choose potatoes of the same size. Scrub them, and put them into a saucepan. Pour on enough boiling water to come to 1 inch above the top of the potatoes. Bring to a boil, then simmer until they may be easily pierced with a fork. Drain. Shake gently over the fire for a few moments to dry them. Take off a half-inch strip of skin around the center of each potato, or they may be entirely peeled. Serve hot.

Should the potatoes be intended for warmed over dishes alone, it is easier to remove the skins after they are cold. While still hot, however, the skin should be broken to allow the steam to escape.

If they are to be boiled without their skins, scrub them, scrape or pare them thin, being careful to take out all the eyes. Then cook them as directed above.

MASHED POTATOES.

Cook the potatoes without their skins. When done drain thoroughly, and shake over the fire until dry and mealy. Mash them very smooth with a potato beetle, beat them with a fork until light; or put through a ricer. Measure and to 2 c. allow 1 1-2 T. butter, from 1-4 to 1-2 c. cream or milk, 3-4 t. of salt, 1-2 t. of pepper. Heat the milk, add it to the potato slowly, beating constantly. Stir in the salt. Turn the potato into a heated dish. Make indentions over the top with the back of a tablespoon. Into each of these drop a bit of butter. Sprinkle the pepper lightly over the top and place them in the oven a moment until the butter melts.

CREAMED POTATOES.

2 c. potatoes, cut into 1-2 in. blocks.
2 T. butter.
2 T flour.
1 c. milk.
1-2 t. salt.
1-12 t. pepper.

Cover the potatoes with boiling water and simmer until tender. Meanwhile put the butter and flour into a saucepan and stir over the fire until smooth. Add the milk, stir until it boils and thickens. Add the seasoning. When the potatoes are cooked, drain them, stir them into the sauce, reheat, and serve at once.

LYONNAISE POTATOES.

1 c. cold boiled potatoes, cut into 1-2 inch blocks.
1 1-2 T. drippings or butter.
1 T. chopped parsley.
1 T. chopped onion.
1-4 t. salt.
1-16 t. pepper.

Cook the onion in the fat until a pale brown. Mix the salt with the potatoes, then turn them into the pan and stir until hot. They should not brown. Sprinkle the parsley over, heat for a moment, dust with pepper and they are ready to serve.

SCALLOPED POTATOES.

1 c. potatoes.
1 c. milk.
2 T. butter.
1 T. flour.
3-4 t. salt.
3 dashes pepper.

4 T. stale bread crumbs, moistened with 1 T. melted butter.

Pare the potatoes, and slice them very thin. Put the butter and flour into a saucepan, stir over the fire until smooth, pour in the milk, and stir constantly until boiling, then add the salt and pepper. Place a layer of the sauce in the bottom of a baking dish, then a layer of potatoes, and so continue until all are used, having the last layer of sauce. Sprinkle the bread crumbs over the top and bake in a moderately quick oven until the potatoes are tender and the top browned. Keep the baking dish covered for the first 15 minutes of cooking.

HASHED BROWNED POTATOES.

2 c. cold boiled potatoes. 1 t. salt.
3 T. drippings or other fat. 1-6 t. pepper.

Chop the potatoes very fine and mix with them the salt and pepper. Put the fat in a skillet and set on the stove until smoking hot, then turn in the potatoes and pack them down well. They should be not more than a half-inch in depth. Move the pan to a part of the stove where the cooking will be rather slow. Do not stir the potatoes at any time. In order to decide whether they are browning, a thin bladed knife may be inserted carefully about the edge, from time to time, and when lightly browned around the sides, the bottom will be brown enough. Fold one-half over the other, run a limber bladed knife underneath to loosen them well from the skillet. Turn out with care, so that they may keep in shape.

MACARONI WITH TOMATO SAUCE.

Break the macaroni into inch pieces. For 1 c. of macaroni put 6 c. of boiling water in a saucepan. Add 1-2 T. salt. When the water comes to boiling point, add the macaroni, and cook rapidly until tender. This will take from 20 to 45 minutes, depending upon the quality and age of the macaroni. When done, drain, and to 2 c. of macaroni allow 1 c. of tomato sauce. Heat the macaroni in the sauce.

Tomato Sauce 2 T. butter, 2 T flour, 1 c. strained tomato juice, 1-2 t. salt, 1-12 t. pepper. Put the butter and flour into a saucepan, and stir over the fire until well blended, pour in the tomato juice, and stir until it boils and thickens. Add the seasoning. If the tomatoes are very sour 1 t. granulated sugar may be added.

MACARONI WITH CREAM SAUCE.

Cook the macaroni as for Macaroni with Tomato Sauce. When tender drain well, and re-heat in a cream sauce, using 1 c. of the sauce to 2 c. of macaroni.

BAKED MACARONI.

1-4 lb. macaroni.
1-4 lb. grated cheese.
1-2 c. cream or milk.
2 T. butter.
Salt, paprika or cayenne.

Boil the macaroni as directed in Macaroni with Tomato Sauce. Drain. Mix it and the cheese together, adding paprika and salt to taste. Put into a small baking dish. Cut the butter into bits. Put it over the top. Pour on the cream or milk. Bake in a quick oven until brown on top.

WATERY VEGETABLES.

BOILED CORN.

Husk and silk the corn. Drop it into boiling, unsalted water. Cover and let the water come quickly to boiling point again. Cook 1 minute if the corn is young, and 3 minutes if old. Take it out, and serve immediately, covered with a napkin.

STEWED CORN.

Cut the corn from the cob. Measure. To 2 c. of corn allow 1-2 c. boiling water. Put the corn and water into a covered saucepan. Bring quickly to a boil. Cook 3 minutes. Drain off any water, and to each 2 c. of corn add 2 T. butter, 4 T. cream or milk, 1-2 t. salt, and 1-12 t. pepper. Stir all together over the fire until steaming hot. canned corn may be dressed in the same way, care being taken to drain off all water before heating.

FRESH CORN FRITTERS.

2 c. grated corn.
1 t. salt.
1-6 t. pepper.

Mix the ingredients together. If the corn is medium ripe the consistency will be correct. Should very young corn be used, a small amount of flour may be added, or, if the corn is old, a little milk may be stirred in. Put drippings, cottolene, or lard into an iron skillet. Let it get smoking hot. Then put in the fritters, a small tablespoonful at a time. Brown on each side. Serve hot.

CANNED CORN FRITTERS.

1 egg.
1-2 c. milk.
3-4 c. flour.
3-4 c. canned corn.
3-4 T. butter.
3-4 t. baking powder.
3-4 t. salt.

Beat the egg until thick, add the salt, butter (melted) and milk. Sift in the flour, beating until smooth. Stir in the corn and baking powder, mixing well. Put into a sautepan enough cottolene or lard to cover the bottom when melted. Place it on the stove, and when smoking hot, drop in the batter, by small tablespoonsful.

Brown lightly on one side, then turn and brown the other. Serve at once.

CORN PUDDING.

2 eggs.
1 1-2 c. corn.
1 c. milk.
1 T. butter, melted.
3-4 t. salt.
1-8 t. pepper.

The corn should be young. Cut it from the cob. Beat the eggs light without separating. Add the other ingredients. Turn into a small baking dish. Cook in a moderate oven until firm in the center, usually from 30 to 40 minutes. Serve hot, as a vegetable.

FRIED OR SAUTED ONIONS.

Peel the onions and cut them crosswise into thin slices. For 4c. of sliced onion use 4 T. drippings or butter, 1 t. salt, 1-6 t. pepper. Heat the fat in an agateware pan. Put in the onions, sprinkle with the salt. Cook over a slow fire, stirring occasionally until tender and slightly browned. Dust with pepper. Serve alone as a vegetable, or put them on the top of a broiled or panned beefsteak.

SCALLOPED ONIONS.

1 c. sliced onions.
3-4 c. stale bread crumbs.
1-2 c. cream sauce.
1 1-2 T. butter.
1-4 t. salt.
1-16 t. pepper.

Boil the sliced onions in salted water until tender. Make the cream sauce, and add the onions, which have been well drained. Melt the butter, and mix it with the bread crumbs, adding also the salt and pepper. Spread half of the crumbs over the bottom of a baking dish, cover

with the onions, and put the remaining crumbs on top. Bake on the upper rack of the oven for about 15 to 20 minutes, or until the top is lightly browned.

BOILED STRING BEANS.

Wash and string the beans, and cut or break them into half-inch pieces. Cook in boiling salted water until tender. Drain, measure and to each cup of beans allow 1 T. butter, 2 T. cream or milk, and 2 dashes pepper. Heat all together until steaming hot.

HOT SLAW.

Trim the cabbage, wash it, and cut into quarters. Then slice fine. Cook rapidly in boiling, salted water until tender. Drain, measure, and to 2 c. allow 1-2 c. strong vinegar, 4 T. butter, 1 1-2 t. salt, 1-4 t. pepper, 4 t. sugar. Put all together in a saucepan, cover, and simmer gently for 5 minutes. Serve hot.

COLE SLAW.

1 c. finely sliced cabbage.
1-6 c. thick sour cream or milk.
1-6 c. vinegar.
Yolk 1 egg.
2 t. sugar.
1-2 t. salt.
1-8 t. white pepper.
Speck of cayenne.

Wash the cabbage, trim off any discolored parts, cut in quarters, and slice in very fine shreds, using only the outer parts of the head. (The coarser portions, near the center may be cooked as creamed cabbage, or else chopped fine, and made into pepper sauce.) Put the sour cream into a saucepan. If thick milk is used instead add 1-2 T. butter. Set in on the fire and let it become steaming hot. Meanwhile, beat the yolk of egg and add to it the remaining ingredients, then turn this mixture into the hot cream. Stir all together over the fire until slightly thick, remove, and pour over the cabbage, mixing well. Set away to cool, stirring occasionally.

CREAMED CABBAGE.

Trim and wash the cabbage. Cut it in half-inch pieces Put into boiling salted water and cook rapidly, uncovered, until tender, about 20 minutes. Drain and measure. One cup of cream sauce will be required for 2c. of cabbage. Heat the cabbage in the sauce and serve.

LETTUCE, DUTCH STYLE.

1 medium-sized head lettuce.
1-4 lb. bacon or ham.
1-2 c. sour cream.
2 T. vinegar.
1 egg.

Separate the leaves of lettuce, wash them thoroughly, and tear the large leaves into several pieces. Cut the bacon into half-inch blocks, and saute until a pale brown; add the cream, bring to boiling point, thicken with the egg which has been beaten, add the vinegar and 2 dashes of pepper. Pour the dressing, while hot, over the lettuce, mix thoroughly and serve at once.

BOILED ASPARAGUS.

Wash the asparagus carefully and cut off the tough ends. Tie it in a bundle, and put into a saucepan, with the tips up. Pour on enough boiling water to come within an inch of the top. Add 1 t. of salt to each pint of water. Simmer until tender. Drain. Save 1 c. of water, and use it in making a drawn butter sauce. When it is finished pour it over the asparagus, which has been kept hot.

DRAWN BUTTER SAUCE.

4 T. butter.
2 T. flour.
1 c. boiling water.
1-2 t. salt.
1-8 t. white pepper.

Put the flour and half of the butter into a saucepan and stir over the fire until well blended. Add the boiling water, or—better—the same amount of water in which the vegetable has been cooked. Stir constantly until boiling and thick. Add seasoning, using less if the vegetable stock has been seasoned previously. Add the remaining butter, stirring until it melts. The sauce should not boil after this last portion of butter has been turned in.

CREAMED CELERY.

1 1-2 c. celery, cut into 1-inch pieces.
1-2 c. cream sauce.

For this recipe, one may use the outer portions of the celery, which are not tender enough to serve raw. Cook the celery in white stock, or salted water, for 20 to 30 minutes. Drain well, put it into the cream sauce, reheat, and serve hot.

CAULIFLOWER WITH CHEESE SAUCE.

1 medium-sized head cauliflower.
1 c. cream sauce.
4 T. grated or finely chopped cheese.

Trim the leaves from the cauliflower and soak it, head down, in salted water for 1-2 hour. This is for the purpose of drawing out insects should any be lodged among the flowerets. Then place the cauliflower, head down, in a large saucepan of salted, boiling water, and cook rapidly for 15 to 20 minutes, or until tender. Drain thoroughly. Cut the flowerets apart, put it into the sauce, reheat, and serve.

To make the cheese sauce, prepare cream sauce and add the cheese, stirring over the fire until the cheese melts, season with paprika or cayenne.

STEWED TOMATOES.

Wash the tomatoes, pour boiling water over them, let stand a moment, drain and cover with cold water. Then peel them, and cut into pieces. Put them in a granite saucepan and cook for about 10 to 15 minutes, until tender. Measure and to each pint allow 2 T. butter, 4 T. flour, 2 T. stale bread crumbs, 1-2 t. salt and 1-12 t. pepper. If the tomatoes are very sour, 1 t. granulated sugar may be added. Put the butter and flour into a saucepan, rub together until smooth, pour in the tomatoes, then stir constantly over the fire until boiling and thick. Mix in the rest of the ingredients and serve. Canned tomatoes may be dressed in the same way.

FRIED (OR SAUTED) TOMATOES.

Either green or ripe tomatoes may be sauted. Most persons prefer the latter. Select smooth ones of medium size, wash them and cut crosswise into half-inch slices. Sprinkle on both sides with salt and pepper. Put into a skillet enough of drippings or other fat to cover the bottom of the pan when melted. Place on the stove until smoking hot, then lay in the slices of tomato, dipping each into flour just before putting it in the pan. Brown on one side, then turn and brown the other. If the pan becomes too dry while cooking, add more fat. When finished, put the tomatoes on a heated dish. Measure the grease in the pan, and to each T. add 1 T. flour, and mix until smooth. To this amount add 1-2 c. milk, and stir constantly over the fire until boiling, season if needed and pour over the tomatoes. Serve hot.

BREADED TOMATOES.

Wash and wipe the tomatoes, and cut crosswise into slices from one-half to three-fourths of an inch thick. Season them on both sides, dip into slightly beaten egg, and then into either stale or dried bread crumbs. (The former give a better appearance, while the latter are more economical.) Put into a skillet enough grease to be about a sixteenth of an inch deep when melted. Let it become smoking hot, lay in the tomatoes, brown on one side, then on the other, turning only once. Serve on a heated dish.

If more fat is needed during the cooking, add only a small portion at a time.

FRUITS.

APPLE SAUCE.

Select tart, spicy apples, wash, cut them into quarters, remove blossom and stem ends, and core, but do not pare. Drop them into cold water until all are ready, then drain, put them into a granite saucepan and add boiling water in the proportion of 1-2 c. water to 1 qt. apples. Cover, bring quickly to boiling point, then simmer until tender. Press through a granite ware colander, measure and to each cup of sauce allow 2 T. granulated sugar. Stir the sauce and sugar together over the fire until steaming hot, and serve either hot or cold. If the sauce is preferred hot, 1 t. butter may be added to each cup of sauce. In case it is to be used cold, a slight grating of nutmeg, or small amount of ground cinnamon may be stirred in.

STEWED APPLES.

For this recipe, sweet apples are better than sour, as the former keep their shape in cooking. Wash the fruit, cut into quarters, take out the core, blossom and stem ends, and pare. Drop the pieces into cold water until all are finished. Drain, place them in a granite saucepan, broad enough that there may be only one layer of fruit. Pour into the pan 3 T. boiling water for each apple, and sprinkle with sugar, 1 1-2 T. to each apple. Cover the saucepan, and cook very slowly until tender, but not broken. (Turn them over once while cooking.) Remove carefully, pour the syrup over them, sprinkle with a little grated nutmeg and serve cold. After taking out the apples, if the syrup looks thin let it boil without a cover for several minutes.

BAKED APPLES.

Tart apples of good size should be used for baking. Wash them, take out the stem and blossom ends and cores. Make a cut through the skin directly around the center of the apple. This keeps them from bursting in an unsightly way. Arrange them close together in a baking pan, and put into the cavity of each 1 T. granulated sugar, 1-2 t. butter and 1-16 t. ground cinnamon. Cover the bottom of the pan with boiling water, place in a brisk oven and bake —basting every 10 minutes—until the fruit is tender. If the water in the pan cooks away, add a little more. When finished, there should be a small amount of juice to pour over the apples. Serve either hot or cold.

STEWED RHUBARB. NO. 1.

1 1-2 c. rhubarb. 1-2 c. sugar.

3 T. water.

Wash and trim the rhubarb, but do not peel it unless tough. Cut it in inch pieces; and put into a saucepan, adding the sugar and water. Bring to boiling point, then simmer until tender and clear. If it is not stirred while cooking the pieces will keep their shape fairly well. Serve cold.

STEWED RHUBARB. NO. 2.

Use the same proportions as in stewed rhubarb No. 1, but omit the water. After preparing the rhubarb put it and the sugar into a double boiler and cook until tender. Remove the rhubarb with care so that the pieces may not lose their shape, return the syrup to the fire and cook, uncovered, until slightly thick. Pour it over the rhubarb and serve cold.

STEWED RAISINS.

1-2 c. raisins. 1-2 T. cornstarch.
1 c. boiling water. 1-8 c. sugar.

2 thin slices lemon, if liked.

Wash, stem and seed the raisins, put them into a saucepan with the boiling water, bring to a boil, then simmer until tender—about 20 or 30 minutes. Remove, strain out the fruit and measure the liquid. There should be 1-2 c. If not, add water. Mix the sugar and cornstarch, pour over them the hot liquid, stirring thoroughly. Return to

the fire and continue to stir until boiling and clear; remove, add the raisins (and slices of lemon, if desired) and turn out to cool.

PICKLED PRUNES.

1-4 lb. prunes.
1-2 c. vinegar.
3-8 c. sugar.
2 in. stick cinnamon.
3-8 t. whole cloves.
1-2 doz. whole allspice.
1-2 small bay leaf.

Wash the prunes, soak over night and when ready to cook, drain, saving 1-4 c. of the water. Put it and the prunes in a saucepan, add the rest of the ingredients, bring to a boil, then simmer for about a half-hour, or until the fruit is tender. Drain, return the juice to the fire, and boil, uncovered, until thickened somewhat. Pour it over the prunes, and serve cold, with meat.

STEWED CRANBERRIES.

1 pt. cranberries.
1 c. granulated sugar.
1-2 c. boiling water.

Pick over the cranberries, wash them and put into a saucepan with the boiling water. Cook over a moderate fire for 5 minutes. Do not stir them. Then sprinkle the sugar over, and cook slowly, uncovered, for 10 minutes. Skim off any froth, turn them out, and put at once in a cold place. If properly cooked, the juice will form a jelly. Serve with chicken or turkey.

STEWED EVAPORATED APRICOTS.

1-4 lb. evaporated apricots.
1-4 c. sugar.
1 c. cold water.

Wash the apricots through several waters, then put them with the cup of cold water to soak over night. In the morning set them on to cook in the same water, bringing to boiling point, then simmering until tender. Sprinkle the sugar over, and cook slowly for 10 minutes, then drain, return the juice to the fire and boil until slightly thickened. Pour it over the apricots, and stand away to cool.

STEWED DRIED PEACHES.

1-4 lb. dried peaches.
3-8 c. sugar.
1 1-2 c. cold water.

Prepare and cook in the same way as evaporated apricots.

BEVERAGES.

TEA.

5 t. tea. 1 pt. freshly boiled water.

Scald an earthenware teapot, put in the tea, pour on it the boiling water, cover and let it stand for 5 minutes on a moderately warm part of the stove—where it cannot boil. Then use immediately, if possible. In case it can not be served at once, pour the tea into a heated pitcher, throw away the leaves, then return the tea to the pot and keep hot until needed.

COFFEE (BOILED.)

5 T. ground coffee. 1 1-2 c. boiling water.
1-2 T. white of egg, or 1-2 shell, crushed. 1-2 c. cold water.

Grind the coffee moderately fine, put it into the pot, stir in the egg and 1-4 c. cold water. Pour on it the freshly boiled water, place over a brisk fire and bring rapidly to boiling point. Then set it on the back of the stove, pour in quickly 1-4 c. cold water and let stand 5 minutes to settle. If not ready to use at once, treat in the same way as directed for tea.

FRENCH COFFEE.

5 T. ground coffee. 1 pt. boiling water.

For this method, the coffee should be ground very fine. Scald a French (or drip) coffee pot, and set it on a part of the stove where it will keep warm. Put the coffee on the upper strainer, pour freshly boiled water over it slowly and replace the lid. If desired extra strong, a cupful or two may be taken out and poured over the coffee a second time. Naturally, some flavor escapes when this is done.

After the liquid all drains through, in about 3 minutes, the beverage is ready to serve.

If it is desired to make coffee in a cheese-cloth bag, by the drip process, the berry should be ground to a powder.

COCOA.

4 t. cocoa. 1 c. boiling water.
8 t. sugar. 1 c. milk.

Put the cocoa and sugar into a saucepan, mix thoroughly, pour in the boiling water, bring the mixture to a boil, and cook for 2 minutes. Meanwhile, put the milk into another saucepan, let it become scalding hot, then add it to the cocoa **and serve at once.**

If liked, a few drops of vanilla extract may be stirred into the beverage at the moment of serving.

CHOCOLATE.

Chocolate is made like cocoa, except that 1 T. of grated chocolate is used in place of each t. of cocoa, and chocolate needs boiling for 3 minutes.

SOUPS WITHOUT MEAT STOCK.

CORN SOUP.

1 c. milk.
1 c. boiling water
2 T. butter
2 T. flour.
1-2 c. canned or stewed corn.
1-2 T. chopped parsley.
1-2 t. onion juice.
1-16 t. grated nutmeg.
1-2 t. salt.
1-16 t. pepper.

Bring the milk and water to a boil, add the butter and flour, which have been well mixed, stir constantly until the soup boils, add the rest of the ingredients, let it stand over the fire for a moment, and is ready to serve. Do not boil after adding canned corn, as it has already been sufficiently cooked.

GREEN PEA SOUP.

Use stewed or canned peas, and make in the same way as corn soup.

CREAM OF DRIED BEAN SOUP.

1 c. dried beans.
1 c. milk.
2 T. butter.
2 T. flour.
1 sprig parsley.
1-2 small bay leaf.
1 t. onion juice.
Salt, pepper.

Soak the beans over night, then cook them, with the bay leaf and parsley, until tender. Drain, press through a sieve, add the milk and one cup of the water in which they were cooked; bring to boiling point and thicken with the flour and butter which have been well blended. Add the onion juice and seasoning, and serve with croutons.

POTATO CHOWDER.

2 medium-sized potatoes.
1 oz. bacon or ham.
1 c. milk.
1 1-2 c. boiling water.
1 small onion.
2 T. butter.
2 T. flour.
1-2 T. chopped parsley.

Salt, pepper.

Scrub the potatoes, pare them and cut into half-inch blocks; chop the onion fine and cut the bacon or ham in small pieces. Then cook the meat and onions together, stirring occasionally, until a pale brown; add the potatoes and the boiling water, and simmer for 20 minutes. Pour in the milk, let the soup come again to a boil, add the salt and pepper, also the butter and flour which have been well mixed, and stir constantly until boiling. Then cook for a minute or two, sprinkle in the parsley, and it is ready to serve.

PLAIN TOMATO SOUP.

1 c. stewed or canned tomatoes.
1 1-2 c. boiling water.
1 oz. ham.
2 T. flour.
1 T. butter.
1-2 stalk celery.
1-2 small onion.
1-4 carrot.
1-4 bay leaf.
1-2 t. salt.

1-12 t. pepper.

Cut the ham, carrot, celery and onion into very small blocks or slices. Put the onion and ham into a small skillet, place over the fire and stir occasionally until slightly browned. Then turn them into a saucepan adding the carrot, celery, bay leaf and water. Bring to a boil and simmer for 20 minutes, then pour in the tomatoes and simmer for 10 minutes. Press through a sieve and measure. There should be 2 c. If not, add water. Return the soup to the fire, let it come to a boil and stir in the butter and flour which have been well blended. Continue to stir until boiling, add the seasoning and serve.

Should the tomatoes be sour, 1-4 t. bicarbonate of soda, or 1-2 t. sugar may be stirred in just before serving.

SUGARS.

CANDY.

Clear Lemon Taffy.

1 c. granulated sugar.
1-4 c. water.
2 T. butter.
2 t. lemon juice.
Grated rind 1-4 lemon.

Boil the sugar and water, without stirring, until a soft ball may be formed when the syrup is dropped into cold water, then add the butter and lemon juice, and boil until the syrup will crack. Have a greased pan ready, scatter the lemon rind on it, pour the syrup over, let stand until almost cold, then crease into squares.

WALNUT MOLASSES CANDY.

1-4 c. New Orleans molasses.
1-2 c. brown sugar.
1-2 c. chopped walnuts.
1 T. water.
1 T. butter.
1 T. vinegar.
1-4 t. soda.

Boil the molasses, sugar, butter, water and vinegar over a slow fire until the syrup will crack when cooled in cold water, then add the soda. As soon as it foams, remove from the fire, and pour over the walnuts, which have been placed on a greased tin pan, then stand away until cold.

CARAMEL NUT TAFFY.

1 c. granulated sugar.
1-4 c. chopped nuts.

Roasted peanuts will answer quite well for this taffy. Chop them fine. Grease a tin pie plate. Scatter the nuts over. Put the sugar into a small iron pan and stir constantly over a moderate fire until it melts and turns a pale brown. Remove at once, and pour it over the nuts. When slightly cool, mark off into squares. This candy should be used soon after it is made, as it quickly gathers moisture.

PULLED TAFFY.

1 c. brown or granulated sugar.
1-8 c. vinegar.
2 T. butter.
1-8 c. water.
1-2 t. flavoring.

Put the sugar, water and vinegar into a saucepan. Stir until it begins to bubble, then cook without stirring until it will spin a thread. Add the butter. Cook until it is brittle. Pour out on a greased tin plate. Do not scrape out the saucepan, or the candy will be sugary. Stand away until cool enough to pull. Pour the flavoring in the center and

fold the taffy over it . Pull until light colored and stiff, then cut into inch pieces.

In pulling any kind of taffy, keep the hands firm. Let the candy move. If the hands are allowed to slip along the taffy, they will probably blister. There is no necessity for greasing the hands before pulling taffy.

MAPLE NUT FUDGE.

1 c. maple sugar.
1-4 c. cream or milk.
1-4 c. chopped pecans.
2 T. butter.
1-4 t. vanilla extract.

Boil the sugar and cream until the soft ball stage is reached, add the butter and cook again until it may be formed into a soft ball; then remove from the fire and beat until slightly cooled, add the nuts and vanilla, and continue beating until stiff enough to retain its shape. Pack in a greased pan, and cut into blocks.

CHOCOLATE CARAMELS.

2 oz. unsweetened chocolate.
1 T. molasses.
1-4 c. cream or milk.
1-2 lb. brown sugar.
2 T. butter.
1 t. vanilla extract.

Put the chocolate into a small saucepan and set it over the steam of the tea-kettle to melt. Into another small saucepan turn the cream or milk, molasses, sugar and butter. Stir over a moderate fire until it begins to bubble. Then cook slowly until it will form a soft ball when dropped into cold water. Add the chocolate and cook again until a stiff, but not hard, ball can be formed. Pour in the vanilla when nearly finished. Have a small square pan well greased. When the candy is done, pour it in. Do not scrape the saucepan. Set it away until almost cold, then mark off the blocks.

PROTEIDS.

CHEESE.

Cottage Cheese, or Schmier-Kase.

Place thick, sour milk on the back of the stove, and heat slowly until the curd and whey separate. If tested with a thermometer, it should register from 115° to 120° F. Pour the cheese into a thin muslin or cheesecloth bag, and let it drain as dry as possible without pressure. If no suitable bag is at hand, a piece of cheesecloth laid over a sieve or colander will answer. When no more moisture drips

out, mash the cheese fine with a fork, or press it through a sieve. To each cup add 1-2 t. salt and 4 T. or more of cream, beating the cheese as light as possible. If liked, 1-12 t. white pepper may be stirred in. Chill the cheese, if possible, before serving.

SCALLOP OF RICE AND CHEESE.

1 c. milk.
1-2 c. rice.
3 oz. grated cheese.
1-4 c. bread crumbs.
1 T. butter.
Salt. Paprika.

Cook the rice as directed for boiled rice. (It should make about 1 1-2 c. after cooking.) Drain well, then put layers of rice and cheese in a small baking dish, sprinkling a little salt and red pepper over each layer of rice. Pour the milk over. Melt the butter, stir it well with the bread crumbs, then spread these over the top of the mixture. Bake on the upper rack of a moderate oven until the crumbs are brown. Serve at once.

CHEESE CUSTARD TOAST.

4 slices bread.
2 eggs.
1 c. milk.
1-4 lb. sharp cheese grated.
2 T. butter.
1-4 t. salt.
Sprinkling of cayenne.

Spread the butter on the bread, then cut it in inch blocks. Select a small baking dish, put in the bread and scatter the cheese over it. Beat the eggs, add to them the milk, salt and pepper, and pour over the mixture of bread and cheese. Bake in a moderate oven until the custard is set, and the top browned. Serve hot.

EGGS.

SOFT BOILED EGGS.

Select a saucepan of a size to hold the eggs with only little spare space. Pour into it boiling water, allowing 1 c. for each egg. Slip the eggs into the water, put a lid on the saucepan, and place it on a table, or where it may keep warm (not hot) for 10 minutes. By this means, the white and yolk cook evenly, and are soft and jelly-like.

POACHED EGGS.

Fill a shallow pan half full of boiling water, adding 1 t. of salt for each pint of water, and place the pan where the water can barely simmer. Break each egg separately into a saucer, and slip it carefully into the water. When

the white is set, but still slightly clear, trim off any rough edges, then lift out the egg, and place it on a neat square or circle of dry toast—which has been prepared before cooking the egg. Serve at once, passing melted butter, if desired.

Fresh eggs only are satisfactory for poaching. In case such can not be had, the eggs keep their shape better, and there is less waste, if they are cooked in a utensil called an egg poacher. This has a separate cup for each egg.

SCRAMBLED EGGS.

4 eggs. 2 1-2 T. butter.
2 T. hot water. 1-2 t. salt.
1-12 t. pepper.

Break the eggs into a dish, add the hot water and stir it through the whites, being careful not to break the yolks. (The hot water dilutes the albumen, and makes the cooked egg more tender.) Melt the butter in a small skillet, turn in the eggs, and as they set, loosen from the pan with a limber-bladed knife. They should not be stirred constantly, else the white and yolk become too thoroughly blended. (Scrambled eggs, when finished, should show the white and yolk distinct. In this they differ from an omelet.) When almost done, sprinkle with the salt and pepper, which have been mixed together. As soon as the eggs are set, turn them out on dry toast or on a warmed platter and serve at once.

PLAIN (OR FRENCH) OMELET.

2 eggs. 1 T. butter.
2 T. hot water. 1-4 t. salt.
1-16 t. pepper.

Scour a small omelet pan with salt, wipe out with a dry towel, put the butter in the pan, and set on the back of the stove to melt while preparing the omelet. Beat the eggs—without separating—barely enough to mix the white and yolk well. They must not be light. Then stir in the hot water. Bring the pan to the front of the stove, as soon as the butter bubbles turn in the eggs, and as they set lift them up from the bottom with a thin-bladed knife, letting the uncooked part run under. When lightly set, sprinkle with the salt and pepper, fold one-half over the other, then

place on the hottest part of the stove for a moment to brown the under side. Loosen carefully from the pan, and turn out on a heated platter, bringing the under side up. Serve immediately.

Before beginning to make an omelet, be sure that all utensils and materials needed are at hand. Unless the omelet is prepared quickly and carefully it will not be a success.

Plain Omelet may be varied in many ways. For instance, to make a Corn Omelet, have ready 3-4 c. stewed corn, put two tablespoonsful over the omelet before folding, and pour the rest about it, when turned out on the platter. Tomato Omelet, using stewed tomatoes, is made in the same manner.

CREAMED EGGS.

4 eggs. 1 c. cream sauce.

Put the eggs into a saucepan of boiling water, bring it quickly to a boil again, then cook for 15 minutes. Remove the eggs, take off the shells, and cut the eggs in half crosswise. Slice a small bit from each end so that the halves may be stood upright. Make the sauce while the eggs are cooking, and when ready to serve, pour it out on a platter, stand the eggs in it and serve hot.

OYSTERS.

RAW OYSTERS.

Select plump oysters of medium size. Strip them carefully. A small piece of shell swallowed may cause serious trouble. If rinsing is necessary, use their own liquor. Water impairs the flavor. Put crushed ice in a small plate, lay on it five or six oysters, with a slice of lemon. Set the plate on a larger one to catch any water when the ice melts. Pass salt and paprika or cayenne with them; also wafers or whole wheat bread. If shells can be obtained, serve the oysters, with their liquor, in the deep shell.

CREAMED OYSTERS.

2 solid cups of oysters. 1 c. cream sauce.
4 slices hot buttered toast.

Make the sauce and the toast before the oysters are cooked. Scald the oysters in their own juice. Save 2 T.

of the liquor which draws out of the oysters during the cooking. Add it and the cooked oysters to the hot sauce. Pour over the toast and serve at once.

OYSTER SOUP.

1 solid cup of oysters.
1-4 c. oyster liquor.
1 pt. milk.
3 T. butter..
3-4 t. salt.
1-16 t. paprika or cayenne.

Scald the milk in a double boiler. Add the butter and seasoning. Scald the oyster liquor in a small saucepan. Put in the oysters. Skim while they are heating. When well-puffed up and the gills curled, remove at once from the stove, pour them and the liquor into the milk and serve.

SCALLOPED OYSTERS.

1 solid c. of oysters.
2 c. stale bread crumbs.
3 T. butter.
1-4 c. cream.
1-4 c. oyster liquor.
1 t. salt.
1-8 t. paprika.

Mix the seasoning and bread crumbs. Melt the butter and add it. Put one-third the crumbs in the bottom of a small baking dish, then half of the oysters, and so on until the ingredients are all used, thus having three layers of crumbs and two of oysters. Pour the cream and oyster liquor over the top; or, if cream is not convenient, all oyster liquor may be used. Bake in a quick oven for 20 to 30 minutes.

FISH.

FRIED FISH.

Small fish are fried whole. See that the fish is scaled, cleaned, washed and wiped dry. Sprinkle inside and out with salt and pepper. Roll in cornmeal, or dip into slightly beaten egg, and then into bread crumbs. Fry in deep fat, which is hot enough to brown a bit of bread in 1 minute. Drain on paper and serve very hot. Either slices of lemon or tomato sauce may be served with the fish.

SAUTED FISH.

Large fish, cut into portions of a size suitable for serving, may be sauted. They are much nicer if boned before cooking.

Season each piece well, roll it in flour or cornmeal. The latter gives a sweeter flavor, and better appearance. If desired, egg and bread crumbs may be used, instead.

Put into a saute pan enough fat to be about an eighth of an inch in depth after melting. Heat until smoking hot, lay in the fish, brown on one side, then the other, turning only once. Do not crowd the pieces in the pan so that they are difficult to turn, as there is danger of breaking the crust. Add a little more fat from time to time, if needed. Serve very hot, on a warmed platter. Lemon and parsley may be used as a garnish.

BROILED FISH.

Small fish may be broiled whole. Large fish are split into halves, lengthwise. If the bones are removed, the two sections cook more evenly; also, the fish is easier to serve. In any case, be sure that the fish is well scaled, cleaned, rinsed and wiped dry.

Grease a double broiler with suet, lay in the fish, brush it lightly with butter, and cook over a brisk fire. If the fish has been split, broil the flesh side first until as brown as desired, then cook the skin side, being very careful not to burn it. If the flesh side be well cooked, the other side will need only a few minutes, perhaps one-third of the entire time. A medium-sized fish may be broiled in about 15 minutes.

When done, remove it with care from the broiler. (The muscular fibre of fish being short, breaks easily.) Lay it on a heated platter, spread quickly with melted butter, sprinkle with salt and pepper, and serve as hot as possible.

CREAMED FISH.

2 c. cooked fish. 1 c. cream sauce.

Free the fish from skin and bones, and separate it into medium-sized flakes. (It is best to use a silver fork or knife. Steel spoils the flavor of fish.) Make the cream sauce, add the fish, and stir over the fire until steaming hot. Serve on buttered dry toast, or garnish with toast points.

MEATS—FRESH.

BROILED BEEFSTEAK.

Select a porterhouse or sirloin steak, wipe it, trim off any surplus fat, put it into a greased double broiler, and cook over a brisk fire, turning every 2 minutes. When

well puffed up, and brown on both sides, it is ready to serve, if liked rare. Sprinkle both sides with salt and pepper, turn out on a heated platter, and serve immediately.

Should the steak be preferred well done, cook it from two to four minutes longer, depending on the thickness of the steak. Test it by pressing a fork against it. If the juice has lost its red color, the meat is well done.

Beefsteak Smothered in Onions. For a small steak—weighing about 1 lb.—allow 6 medium-sized onions. Prepare them as directed for Fried (or Sauted) Onions, lay them on top of a broiled beefsteak, and serve hot.

STUFFED BEEFSTEAK (OR MOCK DUCK.)

1-4 lb. beefsteak.
1 c. stale bread crumbs.
2 T. butter.
2 T. chopped parsley.
2 t. onion juice.
1 t. sweet marjoram.
1-2 t. salt.
1-12 t. pepper.

For this dish, the flank, skirt, or round steak should be used. Trim and wipe it. Melt the butter, pour it over the crumbs, add the flavorings and seasoning, stir well together, then spread the mixture over the steak. Roll it compactly and tie with twine. Put 3 T. of drippings or other fat into a saucepan and heat. Dredge the meat on all sides with flour, lay it in the hot grease, and turn at times until well browned all over. Then pour in enough boiling water to cover it, add 1 small bay leaf, 3 cloves, and a small onion, sliced. Simmer for about 1 1-2 hours, or until the meat is tender. Add 1 t. salt and 1-4 t. pepper when about half done. At serving time take out the meat, set it on a heated dish, and keep in the warming oven while making the sauce. Strain the liquid remaining in the pan, measure, and if there is not a cupful, add boiling water. Put it into the saucepan again, bring to a boil, and thicken with 2 T. flour which have been mixed smooth with 2 T. of cold water. Season the sauce if necessary. Remove the twine from the meat, lay it on a warm platter, and pour the sauce over.

Some persons prefer a tomato sauce rather than a brown sauce with this dish. In such case, the brown sauce should be saved for use with warmed-over meats.

HAMBURG STEAKS.

1 c. chopped lean beef.
2 T. drippings or other fat.
1-2 t. onion juice.
1-2 t. salt.
1-8 t. pepper.

For this recipe, the cheaper cuts of beef, such as the bolar piece or round may be used. Remove all gristle and fat, then chop the meat very fine, and mix the seasoning and onion juice well with it. Form the mixture into four round, flat cakes. Put the fat into a saute pan, heat until smoking, lay in the meat, brown one side, then the other, and take out on a warmed platter. A brown sauce may accompany them. If there is not a tablespoonful of fat in the pan, add enough to make that amount. Then stir in 1 T. flour, add 1-2 c. stock or boiling water, and stir until it boils, seasoning if necessary.

MEATS—CURED.

PANNED HAM.

If possible, select a slice from near the center of the ham, as the central cuts have less gristle and less bone than other portions.

Trim the rind from the slice, leaving a rim of fat a half-inch wide, scrape off any bits of sawed bone, and make gashes an inch apart along the fat. Heat an iron pan smoking hot, put in the meat, and when it can be loosened easily from the pan, turn and continue turning every two minutes until browned on both sides. It should cook over a moderate fire, in order to be well done. Take out on a heated platter, and serve alone, or with cream sauce.

If liked, sour apples may be used as a garnish. To prepare: Wipe and core the apples, and cut them crosswise in slices about 1-3 in. thick. After the ham is done, cook the apples in the grease remaining, in the pan. Brown them on both sides, cooking until tender, but not broken, and place them around the ham.

CREAMED DRIED BEEF.

2 oz. dried beef.
1 c. milk.
2 T. butter.
2 T. flour.
1-12 t. pepper.

Have the meat sliced very thin. If too salt, pour boiling water over it, let it stand a moment, then drain thor-

oughly. Melt the butter in a skillet, put in the meat, and stir occasionally until slightly browned, mix in the flour, pour in the milk, and stir constantly until it boils, then season with pepper, and serve.

LIVER AND BACON SAUTE.

1-4 lb. calf's liver.
2 oz. bacon.
1 T. flour.
Salt, pepper.

The liver should be sliced very thin. Scald it and wipe dry. Have the bacon cut into as many slices as there are of liver. Cook the bacon in a saute pan until lightiv browned, then remove and keep it warm while preparing the liver. Dust the liver with flour, and cook in the fat until brown, sprinkling with salt and pepper. Arrange the meat on a platter with a slice of bacon on each slice of liver. Mix the T. of flour with the fat remaining in the pan, add 1-2 c. boiling water, stir until it boils and thickens, add salt and pepper, if needed, and pour over the meat.

WARMED-OVER MEATS.

CORNED BEEF HASH.

1 c. cooked corned beef, chopped fine.
1 c. cold boiled potatoes, chopped fine.
3-8 c. stock or water.
2 T. butter, or drippings.
3-4 t. onion juice.
1-6 t. pepper.

Put the meat, potatoes, stock, onion juice and pepper into a bowl, and mix well. Melt the butter in a small skillet. Pack in the hash, making it smooth over the top, then cover the pan and place it on the back part of the stove, where it will brown slowly. Do not stir. Cook about 30 minutes. When done, fold like an omelet and turn out on a heated platter. It may be garnished with toast points and parsley.

BEEF WITH MACARONI BORDER.

1 c. cooked beef, cut into half-inch blocks.
1 1-2 c. tomato sauce.
1 c. boiled macaroni.

Make the tomato sauce and divide in half. Into one part put the beef, into the other, the macaroni. Set both mixtures over the fire, and stir them until steaming hot. Add more seasoning, if necessary. Turn the macaroni out on a warmed platter, spreading it to form a circle, place the meat in the center, and serve hot. If liked, 1-2 T. finely chopped parsley may be scattered over the top.

MEAT AND POTATO PIE.

1 c. cooked meat, cut into half-inch blocks.
1 1-2 c. hot mashed potatoes, well seasoned.
3-4 c. gravy or any preferred sauce.
Yolk 1 egg. 1 T. milk.

Mix the meat and gravy and place in a small baking dish. Spread the mashed potato over the top. Beat the yolk of egg, add to it the milk, and brush the mixture over the top of the potato. Place the dish on the upper rack of a moderate oven and bake until the top is lightly browned. Serve at once.

BATTERS; DOUGHS; BAKING POWDER.

A batter, whose original meaning is anything battered or beaten, consists of two or more materials mixed by beating. The simplest form of batter is a mixture of water and some starchy material such as flour. According to their consistency, batters are termed thin or pour batters, and thick or drop batters. A pour batter is usually made in the proportion of 1 cup of liquid to 1 cup or 1 1-2 cups of flour. Pop-overs are an example of the first, and wheat gems of the second proportions. A thick or drop batter has 2 cups, or a little more of flour to each cup of liquid. The term sponge applies to a pour batter containing yeast. Dough is a batter stiff enough to be handled. The proportions for a dough vary from 3 to 4 cups of flour for each cup of liquid.

Batters and doughs are made light, to some extent, by the liquid contained in them. When the mixture is put into the oven, the intense heat expands the liquid, turning it into steam. Thus the entire batter "puffs up." This means is used in the making of certain small breads for invalids. However, the main cause of lightness in batters and doughs is gas. This may be merely air beaten into it, as in the old-time beaten biscuit. Again, air may be mixed in by the addition of eggs, which, because of their albumen, when beaten light, hold the air. Or, the gas may be carbon dioxide, produced by the growth of yeast, or by the action of baking powder. For ordinary use there are several mixtures that may be substituted for baking powder. We may take 1 level teaspoonful of bicarbonate of soda to 1 well-rounded teaspoonful of cream of tartar.

This is, in general effect, the same as a cream of tartar baking powder. Bicarbonate of soda, combined with thick sour milk, is often used, the proportions needed being 1-2 teaspoonful of soda to each cup of clabber. If Porto Rico molasses or sorghum—having an acid reaction—may be had, soda works well in the proportions of 1 teaspoonful to 1 cup of molasses. In any of these mixtures, and also in the manufactured baking powders, the reaction is that of an acid and an alkali in combination. The active principle, the soda, supplies gas.

Bicarbonate of soda is a low-priced substance manufactured from common salt. Cream of tartar, on the contrary, is expensive. This material collects on the bottom and sides of grape wine casks, that from the sides being the better and purer. In this form it is called argols, and has a somewhat brownish or purplish color. In order to remove the color, and substances other than the cream of tartar, it is put through many purifying processes. Because of the cost of manufacture, and also the fact that in cold, rainy seasons grapes yield less than the usual amount of cream of tartar, its price always remains high. The low-priced baking powders have, instead of cream of tartar, some cheap substance, such as alum, which may prove very harmful to one's health. (It is never an economy to save on food materials in such a way that there occurs later the expense of a doctor's bill.)

From the viewpoint of healthfulness, well-made phosphate baking powders probably take first rank. As phosphate powders readily absorb moisture, and lose strength, they should be bought in only small amounts, and one should be careful to keep them air-tight. The latter rule applies also to other kinds of baking powders. If allowed to grow damp, carbon dioxide gas is formed and escapes. In order to prevent this action, all baking powders have some starch added, and thus the particles of the acid and alkali are separated. The starch is called a "filler."

In general, the manufactured baking powders are more satisfactory than such mixtures made in the home. The housekeeper often adds too much soda, or neglects to mix

it thoroughly with the other materials. Then the result is a yellowish dough, or one with brown spots throughout after baking, there is not the proper lightness, and the flavor is unpleasant.

As the lightening of dough by the growth of yeast is a slow process, the name "quick breads" has been given to those raised with baking powder or similar mixtures. These become light quickly, and are usually made in some small form, such as gems, biscuit, etc., so that they bake quickly.

Before beginning to mix any such articles, one should see that there is a steady fire, and a sufficiently hot oven. The baking pans need to be at hand, greased and heated, if necessary. After a batter is mixed, it should never be let stand to lose its lightness while one is getting the baking pans ready. In view of the fact that the moment baking powder is moistened it begins to work, we now add baking powder as the very last ingredient, and just before cooking the batter. By the old method, baking powder was mixed with the flour, and thus lost about one-fourth of its power for giving lightness. Naturally the rule of adding baking powder last can not apply to dough, since its stiffness would cause the powder to mix unevenly.

QUICK BREADS.

DROP BISCUITS.

2 c. winter wheat flour.
4 T. butter or 3 T. lard.
2 t. baking powder.
1-2 c. milk.
1-2 t. salt.

Sift the flour, salt and baking powder into a bowl and rub in the shortening until thoroughly mixed. Add the milk, moistening a small portion of the flour at a time. Use a little more liquid, if necessary, to make a batter that will drop from the spoon. Put into a baking pan, using 2 T. batter for each biscuit, placing them 2 inches apart. Bake in a brisk oven for 15 minutes.

POP-OVERS.

1 egg.
2-3 c. milk.
2-3 c. flour.
1-4 t. salt.

Grease iron gem pans, and set them in the oven to heat. Beat the egg until very light, and add to it the milk and salt. Sift the flour into a bowl. Pour the liquid on grad-

ually, beating constantly. When well mixed, strain through a fine seive into the hot pans. Bake in a quick oven 30 minutes until well puffed up and brown. If properly made and baked they will increase to three or four times their original size, and be hollow shells.

WHEAT GEMS.

2 eggs.
1 c. milk.
1 1-2 c. flour.
2 T. butter.
2 t. baking powder.
1-2 t. salt.

Grease the gem pans and place them in the oven to heat. Separate the eggs, beat the yolks light, and add to them the milk and salt. Melt the butter and stir it in. Then sift in the flour gradually, beating until smooth. Whisk the whites of the eggs very stiff, add them and the baking powder folding in carefully. Pour the batter into the gem pans and bake in a hot oven about 30 minutes.

CORN BREAD (WITH SODA.)

2 c. white corn meal.
1 c. thick, sour cream or buttermilk.
2 eggs.
1 T. butter.
1-2 t. salt.
1-2 t. baking soda.

Sift the corn meal into a bowl, add the salt and butter, pour over it 1 1-2 c. boiling water and stir until well mixed. Let cool, add the eggs well-beaten, and the sour cream. Beat thoroughly, then quickly stir in the soda, which has been dissolved in 2 t. boiling water. Turn at once into a well greased, shallow pan, and bake 30 minutes.

SOUTHERN RICE BREAD.

1 egg.
1-2 c. milk.
1 T. butter.
3-4 c. flour.
1-4 c. boiled rice.
1-4 t. salt.
1 1-2 t. baking powder.

Beat the egg well, add the salt and the butter, melted, then add the rice, mixing until free from lumps, pour in the milk, sift in the flour, and beat until smooth, stir in the baking powder, pour into a well-greased shallow pan, and bake 30 minutes.

If desired, buttermilk or sour milk may be used instead of sweet milk. In this case, omit the baking powder, and use 1-4 t. bicarbonate of soda.

SOFT OATMEAL BREAD.

1 c. cold, cooked oatmeal.
2 eggs.
1-2 c. milk.
1-4 c. cornmeal.
1-4 t. salt.

Scald the milk, pour it over the corn meal, and stir until perfectly smooth. Mash all lumps from the oatmeal, mix it with the corn meal, then add the salt and the beaten yolks of eggs. Fold in carefully the stiffly beaten whites. Bake in a greased pan, in a moderately quick oven, and serve at once.

BOSTON BROWN BREAD.

1 1-2 c. corn nmeal.
1 c. wheat meal.
1 c. rye meal.
2 c. thick sour milk.
1-2 c. molasses.
1 t. baking soda.
1 t. salt.

Sift all of the dry ingredients into a bowl. Add the molasses and sour milk. Mix the batter thoroughly, but quickly. Pour into greased molds, having them slightly over half full; and steam 3 hours, or 4 1-2 hours if the batter is all put into one large mold. Then remove the covers, and place the molds in a moderate oven for one-half hour to dry the crust. Whether the bread is to be served warm or cold, remove from the molds while hot.

Many persons like the addition to the batter of 1 c. seeded raisins.

CAKES.

There are two general classes of cake, those without butter, as sponge cake, and those containing butter, as pound cake.

Sponge cake, when properly mixed, does not need baking powder. The eggs hold enough air to make the batter light. Pound cake, also, although very rich, has enough eggs to ensure lightness. With most cakes, however, baking powder, or a substitute, is used. Certain kinds of cakes, such as the old-fashioned election cake, and several of foreign origin, are raised with yeast.

The most wholesome cakes are those made from angel, sunshine, or sponge cake batter. Their two best features are the absence of shortening and of baking powder. The considerable amount of eggs in such cakes makes them fairly nutritious.

In making cakes of any kind, one should use only good materials. By the heat of baking, poor materials are made worse. It has been said that the "goodness" of cake is its only excuse for being.

Of the various shortenings used in cakes, butter gives the best flavor. When cheap cake is desired, some of the cottonseed preparations or drippings may be used. Chicken or goose grease answers for cakes containing molasses, spices, or chocolate, which disguise the meaty flavor of the fat.

The sugar for cakes should be fine grained. If coarse it makes a heavy, sticky cake, with a hard crust. In case none other than coarse-grained sugar can be had, it should be sifted, and only the fine part used for cake. Brown sugar, occasionally called for in dark cakes, often contains hard lumps, which should be rolled out before using.

In any cake water may be substituted for sweet milk, but water makes a somewhat thinner batter. Cakes containing whites of eggs (and no yolks) are more tender with water than with milk.

For cakes, winter wheat or pastry flour, which is chiefly starch, proves better than spring wheat flour. The latter, on account of its gluten, makes a dry, tough cake. If none but spring wheat flour can be obtained, one-eighth less should be used than of winter wheat flour.

Before beginning to mix a cake, all ingredients should be at hand, and measured. (The measuring of extracts is an exception.) Also, one should see that the heat of the oven is correct, and that there is a steady fire. It should be fixed, if possible, to last throughout the entire baking. Cake pans of heavy tin should be ready. (Cake burns in iron or agate pans.) Two thicknesses of paper are needed in pans for large loaf cakes. For layer cakes a single thickness of paper will answer. One should fit the paper smoothly over the bottom and sides of the pan, cutting out any extra fullness from the corners. It is a waste of time and material to grease the paper. An ungreased paper will not stick to any cake that is properly baked. Small cakes, such as cookies, do better in a pan without a paper lining. Even for these, the pan does not need to be greased, if the cakes are taken out of the pan as soon as baked.

Cake batter should be mixed in an earthen bowl, and with a wooden spoon. A tin pan or iron spoon will discolor the batter.

While the heavy ingredients are being mixed cake needs vigorous beating, but after the beaten whites of eggs have been added, the batter must be folded together lightly.

After turning the batter into the pan, if one spreads it out so that it is shallower in the center than around the sides, the cake will be of a fairly even thickness when baked. The pan should never be more than three-fourths full, or the batter may rise over the sides and be wasted.

Drop cakes, and other small forms will bake in from 8 to 12 minutes. For layer cakes, of about one inch in thickness when baked, 20 minutes is usually the time needed. Loaf cakes, about two to three inches in thickness, need, as a rule, 45 to 60 minutes. The length of time for baking depends, to a considerable extent, upon the richness of the cake. Those having much butter should have long baking in a moderate oven. Cakes containing molasses, which burns easily, need a slow oven. Sponge cake and angel cake should have a very slow oven, because they contain much egg albumen which is toughened by intense heat. Good results may be obtained if one divides the time for baking loaf cake or layer cake into four parts. During the first period the batter should show bubbles over the top, and begin to rise; in the second part, it should rise considerably, and begin to brown; in the third period it should continue to brown; and at the end of the time it should have shrunk somewhat from the sides of the pan, and be settled slightly all over.

To decide whether a cake is done, the finger may be pressed lightly on top, in the thickest part. If it sinks under the pressure, it is not thoroughly baked. Should it rise as soon as the pressure is removed, it may safely be taken from the oven. Testing a cake with a straw is unwise, both because the straw may be unclean, and because a delicate cake may sink under such treatment, and fail to rise again.

As soon as a cake comes from the oven, one should remove it from the pan. (Angel cake is an exception.) It cools best on a wire cake rack, although a board covered

with a clean towel will answer to rest it upon. The paper may be taken off a small cake at once. A large loaf cake, intended for use during several days, will keep moist longer if the paper is left on until the cake is needed.

Cakes should be cooled before icing or cutting. Sponge cake is nicer broken apart in neat pieces rather than cut. Cakes having only a little shortening are best when used the day they are made. Cakes containing much shortening or many eggs are best the next day after baking.

PLAIN CAKES.

ROCK CAKES.

1 c. flour.
3 T. butter or 2 T. lard.
1-4 c. milk.
5 T. sugar.
3 T. chopped nuts.
3 T. currants.
1 T. chopped candied orange peel.
1 t. baking powder.
1-4 t. salt.
1-8 t. grated nutmeg.

Sift the flour, salt, sugar and baking powder into a bowl, rub in the butter, then add the milk, using a little more, if needed, to make a medium stiff drop batter. Stir in the rest of the ingredients, drop by tablespoonsful on a greased baking pan, and bake in a quick oven for 15 minutes.

GINGERBREAD.

1-4 c. molasses.
1-4 c. sour cream.
1-4 c. brown sugar.
2 T. butter.
1 egg.
1 c. flour.
1 1-2 t. ground ginger.
3-4 t. cinnamon.
1-2 t. baking soda.
1-4 t. ground cloves.

Beat the egg, butter and sugar together until light, add the molasses, cream and spices. Sift in the flour and beat until smooth. Dissolve the soda in a teaspoonful of warm water, add it to the batter, beat briskly for a moment, turn the mixture into a pan lined with paper, and bake in a moderate oven for 30 minutes.

PLAIN LOAF CAKE.

4 T. butter.
3-4 c. sugar.
2 eggs.
1 c. water.
2 c. flour.
4 t. baking powder.
1 t. flavoring.

Work the butter in a bowl until creamy, add the sugar gradually, and mix well. Separate the eggs. Beat the yolks, add them to the butter and sugar, and beat briskly

for a few moments. Stir in the water, sift in the flour, and beat until smooth. Add the flavoring. Whisk the whites of the eggs stiff, put them and the baking powder in at the same time, and fold lightly. Pour into a cake pan lined with paper, and bake in a moderate oven from 30 to 40 minutes.

PLAIN COOKIES.

1-4 c. butter.
1-2 c. sugar.
1 egg.
1-4 c. milk or water.
1 1-2 c. flour.
1 1-2 t. baking powder.
3-4 t. grated nutmeg.

Beat the butter to a cream, add the sugar gradually, beat the egg light without separating and add it to the butter and sugar, and beat again. Turn in the milk. Sift in the flour, adding the baking powder and nutmeg with the last half of the flour. When thoroughly mixed, turn out on a floured board. Roll 1-8 inch thick, cut out, and bake in a moderately quick oven 8 to 12 minutes. If liked, 1 T. caraway seeds may be added before the flour, thus making Seed Cookies; or the addition of 1-2 c. chopped nuts will make Nut Cookies.

SPONGE CAKE.

Grated rind and juice of 1-2 lemon.
1 c. sugar.
1 c. flour
4 eggs.

Add the lemon rind and juice to the sugar, and mix well. Separate the eggs, beat the yolks light, add the sugar gradually and beat thoroughly; beat the whites of the eggs stiff, fold them lightly into the batter, then sift in the flour, a little at a time, mixing lightly. Turn into a paper-lined pan, and bake in a moderate oven from 30 to 40 minutes.

LOAF BREADS.

Bread seems to have been a staple article of food among even very early races of mankind. But the most ancient breads were not made in the form of loaves. Instead, they resembled the thin biscuit or crackers of the present day. In some localities, certain of these primitive breads are still used. We may find, for instance, the oat cakes of Scotland, the cassava bread of the West Indies, the tortillas of Mexico, the corn pone of the Southern United States, and others. The Passover bread of the

Jews is probably the oldest surviving bread of this kind. In any of them the mixture consists merely of some sort of meal and water, with the occasional addition of salt. Such a mass, when baked, naturally makes a hard, compact bread. The "raised" or "light" bread, however, made its appearance fairly early in the world's history, as we learn that the Egyptians, more than four thousand years ago, used leaven (sour dough) for causing fermentation. This method was adopted by the Greeks and later by the Romans, through whom the knowledge spread far and wide among the nations with whom they came in contact. Leaven is still preferred in place of yeast by many of our present day bakers.

It would appear that the French first used yeast in bread making. For a time, some thought yeast to be unwholesome, and laws were passed allowing bakers to obtain it only from breweries in or near Paris.

In the United States, the fine exhibit of the Vienna Bakery, at the Philadelphia Centennial, aroused much interest in bread making and in the use of commercial yeast. Since that time, baker's bread in particular, has much improved.

That which we commonly speak of as "yeast" whether liquid, dry, or compressed, consists, to a great extent of tiny, one-celled plants. These are so small that they can be seen only with the microscope. They are round or oblong in shape, and grow by a process called budding:—an old cell divides in two or more parts, each of these being an entire plant.

Like any other vegetable growth, the yeast plant must have warmth, moisture and food. It grows best at a temperature of 75° to 80° F. A heat of 130° to 150° F. will usually kill the plant. At a low temperature, it may keep alive but will not grow.

When yeast is placed in a mixture of starch and water, at a moderate temperature, it produces by its growth what we call fermentation. First, a part of the starch is turned into sugar. Then the yeast splits the sugar into alcohol and carbon dioxide. (The yeast acts as a ferment, and

the process is called the alcoholic or vinous fermentation.) The bubbles of carbon dioxide formed throughout the dough cause the lightness of the bread.

If dough is let stand too long, or in too warm a place, another ferment begins to work upon the alcohol, causing a souring, called the acetic acid fermentation.

There are on the market three forms of yeast:—liquid, compressed and dried. Liquid yeast, called also bakers', home-made, or everlasting, is made, as a rule, from potatoes, hops, sugar, salt, and a certain amount of water, with some previously made yeast added to start fermentation. This keeps well, in a cool place, for about two weeks. In many respects it is quite satisfactory, but it may contain "wild" yeast plants or harmful bacteria.

From the chemist's standpoint, compressed yeast is the best kind to use, because the yeast plants in it are nearly all of the one variety best suited for bread making. The manufacture of compressed yeast forms a large industry. Before being offered for sale, the yeast has enough starch added to make a stiff paste, which is wrapped in tin foil to exclude the air. Compressed yeast is fresh and good so long as it remains a deep creamy color, and firm enough that it may be crumbled easily. When it grows ropy, and shows grayish spots or streaks throughout, with mold on the outside, many of the yeast plants have no life. Such yeast, if used, will give a moldy, or other unpleasant flavor to the bread.

Dried yeast may be made from either liquid or compressed yeast with the addition of some starchy material, usually cornmeal. The mixture is formed into small shapes, which are then dried thoroughly by slow heat. This sort of yeast answers its purpose quite well, when fairly fresh. After being kept for two or three months many yeast plants die.

The two general classes of wheat are known as winter wheat and spring wheat. The latter is planted in the spring and reaped the same year. Winter wheat, being seeded in the fall, remains in the ground during the winter and matures the next summer. This kind is suitable for regions

having a mild climate, while spring wheat does best in northern latitudes, such as the Dakotas, Minnesota and Northwestern Canada.

Of the two varieties, winter wheat, having little gluten, yields a flour suitable for the making of pies and cakes, and for general cooking purposes.

Flour made from spring wheat, because of its larger percentage of gluten, proves the better for bread. (Gluten does not exist naturally in wheat, but is formed in the presence of moisture from two substances found in the grain.) Flour whose gluten is weak, or in small amount, makes bread which easily "falls"—that is, the gas bubbles break. Such flour is called "weak." A "strong" flour is one in which the gluten, being tough, stretches enough to hold the bubbles of carbon dioxide. When the gluten has become set by the heat of baking, it helps to retain the shape of the loaf. A smaller amount of spring wheat flour than of winter wheat is required to stiffen a certain portion of liquid. Thus, spring wheat is the more economical for bread making.

Not until about forty years ago, when the roller process of grinding made a great change in milling methods, did spring wheat become known as a source of high-grade flour.

Previously, for many centuries, grain had been ground between two round, flat stones—called burr stones—placed one above the other. The upper stone was made to revolve. Both stones were grooved. The grain, being fed in through a hole in the upper stone, was crushed between the two, and then passed out through the grooves. By a later process of sifting, it was separated into three products, flour, middlings and bran.

The power for turning mill stones has been had in somewhat recent years from windmills, earlier from water wheels and tread mills. At a still more remote period, the stones were turned by hand, while in primitive times the grains were crushed by means of a rude pestle and mortar.

In the modern steam roller process, the wheat, and later its various parts, are passed through a series of steel rollers. The products formed at first are a low-grade of flour, middlings and bran. The highest grades of flour

are made by re-grinding the middlings. This process is the main feature in which roller-flour mills differ from old-time grist mills. Partly by gravity and partly by sifting through a series of bolting-cloths, whose meshes differ in size, several grades of flour are made. Among millers these are known by certain names which have a definite meaning. But flour to be sold at retail is usually given—in order to attract the customer—some fancy name, such as Diamond or Pearl, Acme or Eclipse, White Lily or Polar Bear and so on. None of these are any guide to the quality of the flour. Often one kind of flour is put out under several different brands. Hence, one should learn other ways of judging the quality of flour. Good wheat flour has a creamy-white color. A grayish tinge denotes a low grade of flour, made, perhaps, from ill-grown or moldy wheat. When flour is extremely white, it may be an inferior grade, rendered white by bleaching. The baker's test for flour is to make a small ball of dough by mixing the flour with cold water. The quality is judged by (1) the color, (2) the amount of water taken up—a dry flour, which absorbs much water, being economical, (3) whether the dough keeps its shape after standing for awhile. This shows the nature of the gluten.

No cereal except wheat yields enough gluten for loaf bread. For this reason, when rye flour or cornmeal is to be made into loaves, considerable wheat flour must be mixed with the dough.

Bread dough is kneaded to increase the elasticity of the gluten, to mix the yeast well through the mass, and to make bread of an even texture, without lumps or streaks.

The objects in baking bread are to kill the yeast plant, and thus stop fermentation, to drive off the alcohol, to expand the carbon dioxide, to stiffen the gluten, and to make the starch digestible and well flavored.

After being baked, the loaves should at once be turned from the pans, and be placed in a current of air, so that the crust may remain crisp. If a towel is placed over the loaves while hot, the crust is softened, and the bread does not keep well.

When eaten quite fresh, bread forms into a sticky mass, difficult to digest. One is wise to let it stand twenty-four hours before using.

Readings: Bread, Farmers' Bulletin No. 112; National Geographical Magazine, March, 1908; Woman's Share in Primitive Culture (Mason), pp. 30, 38-39.

LIQUID YEAST.

4 medium-sized potatoes.
5 c. boiling water.
1-4 c. dried hops.
1-2 c. sugar.
1 c. liquid yeast.
4 T. salt.

Wash and pare the potatoes, cover them with cold water and soak for a half hour. Put the hops and boiling water into a saucepan and cook slowly for ten minutes, then grate the potatoes, quickly add to them the boiling water, pouring through a strainer to remove the hops. (In case one cannot obtain the hops, yeast may be made without them. The use of the hops is to aid in the keeping qualities of the yeast and to give a pleasant flavor to the bread.) Now put the grated potatoes and liquid over a moderate fire and stir constantly for five minutes, remove, add the sugar and salt, mixing well, and turn into a large crock or bowl and allow to stand until luke-warm; then stir in the yeast, cover and let it remain in a moderately warm place for four or five hours, or until it ferments. (Becomes filled with bubbles of gas.) Beat it well several times after it begins to rise; when through, set it away until cool, then pour it into glass jars. They should not be entirely full. Adjust the rubbers and screw the lids on tight. (Before using jars and lids, wash them in quite warm, soapy water, rinse in clear, hot water. Do not wipe but turn them up-side-down to drain before pouring in the yeast.) Keep the yeast in a cool place and stirr well each time before using. One cup of this may be saved to start the next rising, and should be placed in a small jar by itself, as it retains its strength better if kept closed. This yeast should remain good for two weeks.

WHEAT BREAD.

2 c. sweet milk.
2 c. luke-warm water.
2 T. butter or other shortening.
3 t. salt.
1-2 c. liquid yeast.
About 12 c. flour.

Scald the milk. It must not boil, but heat only until bubbles begin to appear around the edge and a thin scum forms on top. Pour the hot milk into the bread pan, add the butter and salt, let stand until luke-warm, then add the water, turn in the yeast and sift in enough flour—beating constantly—to form a thick batter; continue to beat for about five minutes. (In summer, batter should be thicker than in winter, as the yeast works more rapidly in the warm atmosphere. If one prefers an old-fashioned method, some flour may be sifted into the bread pan and the yeast poured into the center.) Cover the pan with a clean towel and put a large lid or a bread board over this. Let stand in a moderately warm place until morning, when it should be quite full of gas bubbles. (Hence this first part of the process is called the bread sponge.) Now add enough flour to make a dough as soft as can be handled. Sprinkle the bread board with flour, turn out the dough, leaving none sticking to the bread pan. (This is one of the signs of the careful, economical cook.) Knead for about fifteen minutes until the dough is smooth and does not stick to the board or hands. It must also be elastic. Test for this by a quick pressure of the finger. If kneaded enough it will spring back into place.

Grease the bread pan, put in the dough, grease it evenly and lightly over the top, or it may be brushed with milk. Cover with a towel and stand it in a moderately warm place until doubled in bulk. Turn it on a bread board; do not sprinkle any flour on the board; work the dough lightly for about five minutes, or until fine grained. One may cut it open—always use a sharp knife—to learn the size of the gas bubbles inside. Do not cut it more than once or twice, or it will lose some of its lightness. When evenly fine grained, shape it into loaves, place in greased bread pans, grease the top of the loaves or moisten them with milk. Put a towel over them and set in a moderately warm place until they become light or about doubled in bulk. Just before placing them in the oven, pierce the top of each loaf in several places with a fork. Bake in a moderately hot oven, allowing forty-five minutes to a single loaf. Pans of a size to hold only one medium sized loaf are best, as the bread becomes more thoroughly baked than when sev-

eral loaves are baked in one pan. Turn out of the pans as soon as baked and place them on a rack or tilt them up against the side of the pan so that the air may circulate around them. This method causes a crisp crust. Do not wrap bread in a towel, as the crust becomes soft and the bread is likely to mould.

Instead of half milk and half water, the liquid may consist entirely of either one. Milk-bread keeps moist longer and is the more nutritious, but is somewhat yellowish in color. Water bread has the advantage of being whiter and cheaper, but contains less nutriment.

In case rich, new milk is used, the butter or other shortening may be omitted. Bread is more wholesome without shortening, but it is thus somewhat tough, and to this most persons object. Many bread-makers add some sugar to the bread sponge. There is no harm in this if the amount be small. Sugar really aids in the growth of the yeast, but it is a decided mistake to use so much sugar that one tastes the cane sugar rather than the natural sweetness of the wheat grain.

WHEAT BREAD. (Short Time Process.)

2 c. milk.
2 c. luke-warm water.
12 c. spring wheat flour, or more of winter wheat.
1 oz. compressed yeast.
2 T. butter.
3 t. salt.

Scald the milk. Pour it into a bowl. Add the butter and salt. Stir until the butter melts. Then add the luke-warm water. Let the mixture stand until luke-warm. Dissolve the yeast in 2. T. luke-warm water. Add it. Sift in the flour, using slightly more or less if the quality of the flour requires it. The dough should be as soft as can be handled easily. Mix thoroughly. Turn out on a board, and knead about 15 minutes, or until smooth and elastic. Place it in a greased bowl. Grease the top of the dough. Put a towel over the top and stand it in a moderately warm place until the dough has doubled its bulk. Turn out on a board (do not dust it with flour) and work lightly for 10 minutes, or until fine-grained. Mold into loaves. Place in greased bread pans. Grease the top of the loaves, and cover with a towel. Stand again in a moderately warm place until they double in bulk.

Bake in a moderately quick oven, allowing 45 minutes to a single loaf. Turn out of the pans as soon as baked, and stand on a rack, or in such a position that the air can circulate around them.

RYE BREAD.

Make and bake in the same way as Wheat Bread, using only 5 c. spring wheat flour and adding sufficient rye flour to stiffen. There may be needed about 8 c., since rye flour contains less gluten than wheat flour. For this reason also, it should be kneaded a somewhat shorter time. If liked, one or two tablespoonsful of caraway seeds may be added to the dough.

FEATURES OF A PERFECT LOAF OF BREAD.

Flavor—"Nutty"—having a distinct flavor of good flour, and not of other ingredients used.
Odor—Pleasant, having no trace of sourness, mould or putrefaction.
Lightness—Both in weight and in appearance of the interior.
Shape—Evenly raised throughout.
Crumb—A fine and even grain.
Tender.
Creamy white.
Elastic—springing back under pressure of the finger.
Crust—Evenly browned.
Crisp, but not hard.

PLAIN DESSERTS. (Hot.)

SCALLOPED APPLES.

2 large sour apples.
1 c. stale bread crumbs.
6 T. sugar.
1-4 c. boiling water.
2 T. butter, melted.
1-4 t. grated nutmeg.

Wash the apples, pare, core and cut into eighths. Mix the bread crumbs, melted butter and nutmeg. Put a layer of the apples in a small baking dish, sprinkle half of the sugar over them, then cover with half of the crumbs; and finish filling in the same order. Pour the boiling water over the top, cover the dish, and bake 1-2 hour, then uncover and bake until the crumbs are brown and the apples tender. Serve hot, with clear vanilla sauce, or hard sauce.

COTTAGE PUDDING.

2 T. butter.
1-2 c. sugar.
1 egg.
1-4 c. milk.
3-4 c. flour.
1 t. baking powder.
1-2 t. flavoring.

Work the butter until creamy, add the yolk of egg, beat well together, then stir in the sugar, and work until light. Pour in the milk, sift in the flour, and beat until smooth. Add the flavoring and baking powder, and fold in lightly the well-beaten white of egg. Turn into a pan lined with paper, and bake from 20 to 30 minutes. Serve hot, with either hard or liquid sauce.

BIRD'S NEST PUDDING.

1 T. butter.
3 T. sugar.
1 egg.
1 t. baking powder.
1-2 c. milk.
3-4 c. flour.
6 peaches
1-4 t. salt.

Remove the skins and stones from the peaches, and place them, cut side down, in a greased baking pan.

Sift the flour, salt, and baking powder into a bowl, rub in the butter, and when well mixed beat the egg, add the milk to it, and turn the liquid into the flour. Beat until free from lumps, scatter the sugar over the fruit, pour the batter on top, and bake in a brisk oven about a half hour. Serve hot, with hard or liquid sauce.

STEAMED GRAPE DUMPLINGS.

2 c. flour.
2 T. sugar.
3 t. baking powder.
1 1-2 c. grapes.
1-2 c. milk.
1-2 t. salt.

Sift all of the dry ingredients into a mixing bowl. Stir in the milk, adding a little more, if necessary, to make a soft drop batter. Have ready five or six baking cups, well greased. Drop into each one rounded tablespoonful of batter, place on this a spoonful of grapes (Concords are best), and cover them with a spoonful of batter. Set the cups in a saucepan containing enough boiling water to reach half way up the cups. Cover the saucepan and simmer for 20 minutes, or until the dough is fairly dry on top, and firm to the touch. Turn the dumplings carefully from the cups, and serve hot with vanilla sauce.

Blackberries or cherries may be used instead of grapes. Sour cherries need to be sprinkled with sugar.

CLEAR VANILLA SAUCE.

1-2 c. sugar.
1 c. boiling water.
2 T. butter.
1 T. cornstarch.
1-2 t. vanilla extract.

Mix the sugar and cornstarch in a small saucepan. Pour over them the boiling water. Stir constantly over the fire until it boils and clears. Add the butter. Stir until melted. When ready to use, add the vanilla. Serve hot.

HARD SAUCE.

1-4 c. butter.
1-2 c. pulverized sugar.
1-2 t. flavoring.

Beat the butter to a cream. Add the sugar by degrees, beating constantly. When light, add the flavoring. Pile on a serving dish, and place in the refrigerator to harden. If liked, a slight grating of nutmeg may be sprinkled over the top.

PLAIN DESSERTS. (Cold.)

JUNKET.

1-2 junket tablet or 1-2 t. liquid rennet.
1 pt. new milk.
1-2 t. vanilla.
4 T. sugar.
Slight grating of nutmeg.

Dissolve the junket tablet in 1 T. luke-warm water. Put the milk and sugar into a saucepan. Stir over the fire for a moment until luke-warm, or 100° F. Remove, add the vanilla and the dissolved tablet, pour the junket into cups that have been slightly heated. Grate nutmeg over the top. Let the junket stand in a moderately warm place about 15 minutes or until set, then put it in the refrigerator for at least 1 hour. Handle carefully lest the curd break. Serve alone, or with a caramel sauce, or a soft custard sauce.

CUP CUSTARD.

2 eggs.
4 T. sugar.
1-2 t. flavoring.
2 c. milk.

Beat the eggs until thick, add the sugar, beat again. Put in the milk and flavoring, mix, pour into baking cups. Stand them in a pan of hot water. Bake in a moderate oven until firm in the center.

RICE PUDDING.

1 pt. milk. 3 T. rice.
3 T. sugar. 1-8 t. ground cinnamon.

Pick over and wash the rice, mix the sugar and cinnamon together, then put all the ingredients into a small baking pan. Place in a moderate oven, stir every 15 minutes and bake until the rice is tender. When almost done, let it cook without stirring, in order that a pale brown crust may form over the top.

PLAIN CORNSTARCH PUDDING.

2 c. milk. Yolks 2 eggs.
4 T. sugar. 3 T. cornstarch.
1-2 t. flavoring.

Put the milk on the stove to come to a boil. Beat the yolks of the eggs, add the sugar gradually and beat until thick, then stir in the cornstarch, a small portion at a time. When smooth, add to the boiling milk. Stir over the fire until it boils for 2 minutes. Remove, add the flavoring, turn out to cool. Serve alone or with cream.

This may be made in a double boiler which avoids risk of scorching the milk. By this method, the pudding needs to be cooked 10 minutes after adding the cornstarch.

COFFEE JELLY.

6 T. sugar. 1-2 t. vanilla.
1 3-4 c. strong, clear coffee. 1-2 oz. gelatine.

Pour 1-4 c. cold water over the gelatine and soak 1-2 hour. Then stir the gelatine into the coffee, which should be hot. After the gelatine is melted, add the sugar. Stir until it dissolves. Then mix in the vinalla. Turn into a mold. Stand in a cold place until it stiffens. Serve with whipped cream, plain cream, or soft custard sauce.

If no jelly mold is at hand, pour the dessert into a shallow dish to stiffen. Have the jelly about 1 inch in depth. When ready to serve, cut into half-inch blocks, and pile them in the serving dish.

SOFT CUSTARD SAUCE.

Yolks 2 eggs. 1-2 t. flavoring.
1 c. milk. 2 T. sugar.

Boil the milk, or scald in a double boiler. Beat the yolks of eggs and sugar together until light. Add to the milk. Stir until it thickens slightly. Remove from the fire. Stand it away to cool. When ready to serve, mix in the flavoring.

SIMPLE PHYSICAL AND CHEMICAL EXPERIMENTS WITH FOOD MATERIALS

STARCHES.

GENERAL APPEARANCE; SOURCES.

1. Pare and grate a small piece of potato. Collect the gratings in a beaker containing some cold water. Then strain through cheesecloth, pressing well. Half fill a test tube. Let stand while preparing the following mixtures. Then put a few drops of iodine into the test-tube. A blue color shows the presence of starch.

2. Put 1 t. cracked or rolled oats in a beaker, add 4 t. cold water. Rub well between the fingers. Strain through cheese-cloth. Half fill a test tube. Set aside. Later examine as in 1.

3. Treat cornmeal by the same method.

4. Treat cream of wheat by the same method.

5. Treat tapioca by the same method.

6. Treat cornstarch by the same method.

7. Treat with iodine each of the following substances: cooked white meat of chicken, white-fish, and white of egg.

8. Put 1-4 t. salt in a test tube, half fill wtih hot water, stir until salt dissolves, cool and treat with iodine.

9. Same as exper. 8, using granulated sugar instead of salt.

10. Treat a small amount of olive oil with iodine.

Questions: Does the characteristic blue color of iodine with starch appear with sugar, fat (oil), mineral matter (salt), or proteid?

Would it appear that the animal, vegetable or mineral kingdom is the source of starch?

What is the general appearance of raw starch under the microscope?

ACTION OF COLD WATER ON STARCH.

1. Treat small portion of dry cornstarch with cold water. Stir well, and filter. Evaporate filtrate on platinum foil. Treat with iodine.

Question: Has the starch changed in form?

Does the filtrate show the usual color of starch with iodine?

ACTION OF BOILING WATER ON STARCH.

1. Treat a small portion of dry starch with cold water, then bring to a boil. Note appearance. Test the temperature when it thickens. Test the temperature when it thickens. Test the temperature when it clears. Examine a little under the microscope.

2. Have 4 t. boiling water in a test tube. Add 1-4 t. dry starch, and stir over a flame until boiling.

3. Put 1-4 t. dry starch in a test tube, mix with 1 t. granulated sugar, pour over the mixture 4 t. boiling water, and stir constantly over the flame until boiling.

4. Put 1-4 t. dry starch in a test tube, mix with it 1-2 t. cold water, add 4 t. boiling water, and stir over flame until boiling.

5. Put 1-4 t. dry starch in a porcelain evaporating dish, rub with it 1-4 t. butter, pour over the mixture 4 t. boiling water, and stir over the flame until boiling.

Question: After starch has been boiled with water, in what ways is its form changed?

Decide upon poor and good methods for thickening soups, sauces, puddings, etc., with flour or other starch.

ACTION OF DRY HEAT ON STARCH.

1. Heat and stir some dry starch slowly in a clean, dry, porcelain evaporating dish. Note change in color.

2. Cool 1, add cold water, filter, and divide the filtrate in two portions. Boil one portion, and note whether it thickens the liquid more or less than does the same amount of raw starch.

3. Treat the other portion with iodine. Note whether any of the dry-heated starch has passed through the filter paper. Note color.

4. Chew slowly a bit of crumb of wheat bread, then chew slowly a bit of moderately brown crust. Note the difference in flavor.

Questions: Does dry heat change starch more or less quickly than moist heat?

Is the form (dextrin) to which starch is changed by intense heat more or less soluble than raw starch? How should the cooking of starch affect its digestibility?

Which may be considered the more digestible, the crumb or the crust of bread?

Does browned (dextrinized) flour thicken a liquid more or less than raw flour? How would this affect the proportions for a sauce?

ACTION OF ACIDS ON STARCH.

1. To a cool starch solution in a test tube add dilute sulphuric acid. Note action on the thickening properties of starch.

2. Treat the results with iodine. Note difference between color and that of raw starch with iodine.

3. To a small portion of dry starch in a porcelain evaporating dish add a few drops of concentrated sulphuric acid. Note the charring.

Questions: In making a sauce, flavored with vegetable acid (such as lemon juice), should the flavoring be added at the moment of serving or earlier?

Should stewed tomatoes be let cook a long or a short time after adding the thickening?

Does the addition of a vegetable acid to starchy foods appear to make them more or less easily digested?

ACTION OF SALIVA ON STARCH.

1. Make a thin starch paste, using 1-2 t. starch to 3 T. water, cook until clear, then divide between three test tubes and cool to 98° F. In a fourth tube collect some saliva. Keep all the tubes standing in warm water at 98° F.

2. Pour part of the saliva into two tubes of the starch paste. Mix well. Let both stand 15 minutes.

3. Add Fehling's solution to the third tube of starch.

4. Add Fehling's to the saliva alone.

5. Treat one tube from 2 with iodine. (A violet color shows it gradually changing to sugar.)

6. Add Fehling's solution to the other tube from 2. (A red ppt. shows the starch changing to maltose.) Compare with 3 and 4.

Questions: What do these experiments teach about the thorough chewing of starchy foods?

PRACTICAL EXPERIMENTS WITH CEREALS, COMPARING COST AMOUNT OF MATERIAL AND METHODS OF COOKING.

1. Select several uncooked cereals. Determine the amount of each needed to thicken 1 c. of liquid, cooking each until well done. Note difference in length of time needed for cooking, hence amount of fuel required. Note amount of material after cooking. Compute the cost of each, and compare.

2. Soak over night 1-4 c. of each of the cereals used in 1. Cook as in 1. Note difference of time in cooking those in 1 and 2, hence cost of fuel required.

3. Choose several of the "ready-to-eat" brands of cereals. Weigh and measure each package, and decide how many persons each will serve, also the relative cost of the portions. Compare the cost of these prepared foods with that of the cooked cereals in 1 and 2.

COMPARATIVE NUTRITIVE VALUE AND COST OF RICE AND POTATOES.

1. Note chemical composition of rice, and of potatoes. Compare the cost of a pound of each with the amount of starch yielded by each. Which is the more economical source of starch as food?

SUGARS.

1. Put 1 t. dry sugar in a porcelain evaporating dish, and heat slowly, stirring constantly. Hold a piece of glass close above it, and note the moisture which collects.

.2 Continue to heat 1, noting the pale yellow color it soon turns. (This stage is called barley sugar.)

3. Continue the heating, and when it turns a red-brown, and begins to smoke, remove from the heat, pour in slowly an equal amount of boiling water. Return to the heat, and bring to a boil. Remove, let cool and taste. (This is called caramel.)

4. Put 1 t. granulated sugar in a test tube, add 2 T. hot water, and stir until dissolved. Divide into two portions. Test one portion with Fehling's solution. Note whether any ppt. forms.

5. To the remaining portion add 1-4 t. lemon juice, boil and test with Fehling's. Note the color of the ppt.

6. Put a small portion of grape juice into a test tube, add a few drops of Fehling's solution and heat. Note the color of the ppt.

7. Put a small amount of honey in a test tube, add an equal amount of water, stir well, add a few drops of Fehling's and heat. Note ppt.

Questions: What may be learned from 1 regarding the keeping of sugar in paper sacks, or in tin boxes?

Do experiments 2 and 3 show that sugar becomes more or less sweet by long cooking? Would it be more economical to add sugar to a dish when put on to cook, or when nearly finished?

From 4 and 5 would you decide that sugar is more digestible when eaten alone, or when used with some fruit acid, as in lemonade?

From 4, 5, 6 and 7, does it appear that cane sugar is the more readily digested or the (invert) sugar found in fruit, and to some extent in honey? Is it well, then, to depend upon fruits chiefly for the sugar needed in our diet, or upon cakes and candy?

FATS.

1. With a bit of litmus paper, try the reaction of a fresh fat, such as lard or olive oil. (The fat will appear neutral.)

2. Test some rancid butter in the same way, and note any acid reaction.

3. Put a bit of suet on platinum foil, place over a flame until very hot. Note the unpleasant odor of burned fat. Test for acidity with litmus paper.

4. Put 1 t. olive oil and 1 t. vinegar into a test tube and shake well together. Note the milky appearance. (Emulsion.) Then hold the tube still, and see the oil globules rise.

5. Let milk stand until cream gathers. Examine a drop of cream, then a drop of milk, under the microscope. Which has the greater number of oil globules? Make drawing. Compare with 4.

Questions: How does intense heat affect fats? Would you think it wise to use fried articles of food often?

What does 2 show about the use of rancid butter in cakes? Judging from 4, can you see any reason for serving acid fruits or vegetables with fat meat—such as apple sauce with pork?

If an invalid needed fatty food, would you think it wiser to give them olive oil and fresh cream, or the fat of roasted meat?

WATER.

EVAPORATION.

1. In two beakers of equal size and like shape put equal amounts of water. Keep one barely bubbling, and boil the other briskly, for 5 minutes. Remove from the heat, and compare amounts remaining. Note advantages and disadvantages of each method, as applied to cooking.

2. Select two utensils that will hold an equal amount of water. Have one broad and shallow, the other narrow and deep. Put an equal measure of water into each. Place both over an equally hot fire. Note the time required for coming to a boil. Let each boil violently until the water is evaporated from one or both. Compare the length of time required.

SOLVENT ACTION.

3. Have at hand some sugar, common salt, and bicarbonate of soda. Fill three test tubes nearly full of cold water. Drop a little of each of the substances into different tubes, and stir. Note how long it takes for each to dissolve.

4. Add more of each substance until the water dissolves no more, and the substance begins to settle on the bottom.

5. Slowly heat the test tubes in 4, and note whether the sediment dissolves.

6. Let 5 stand until cold, and note the result.

7. Filter the liquid from each test tube into three tubes of larger size.

8. To the large test tube holding the salt solution, add dry sugar slowly, stirring meanwhile. Note whether any is dissolved, and, if so, does the salted water dissolve as much sugar as the water used at first in testing the sugar?

9. To the large test tube containing bicarbonate of soda, add sugar as in 8, and compare in the same way.

10. To the large test tube holding the salt solution, add bicarbonate of soda, as in 8, and compare as in 8.

Questions: Can you decide upon certain dishes where different rates of evaporation would be needed, as in 1?

What articles should be cooked in each of the two utensils mentioned in 2? Which of the two methods requires the less fuel, and is thus the more economical?

Can you give the reason for the fact that sugar and salt require different lengths of time to dissolve?

After water has dissolved all that it can of any one substance (then called a saturated solution) is it still able to dissolve any other substance? Decide roughly upon the proportion, if any, of this second substance. How would you apply this knowledge to the question of using hard water in making tea or coffee?

Which seems to dissolve most substances the more readily, cold or hot water? In what way may this fact be applied in cooking?

From 5 and 6 can you decide why sugar crystals sometimes appear in jelly?

PROTEIDS.

MILK.

Composition.

1. To a little fresh milk in a test tube add some Fehling's solution. Boil for a minute. Note whether there is any red color, showing the presence of sugar.

2. Test a little of the milk with iodine, to see whether there is any starch in it.

3. In a test tube have a little milk and a few drops of Millon's reagent. Boil, and note whether there is a pink or red color, showing the presence of proteid.

4. Dissolve half of a junket tablet in 1 T. luke-warm water. Then divide the liquid in four parts.

Bring 1-2 cup of milk to boiling point. To one-half of this, while boiling, add one portion of the rennet. Stand away to cool.

5. Cool remaining half of the milk from 4, to a temperature of 98° F., add one portion of the rennet, and place away until quite cool.

6. To 1-4 cup ice-cold milk, add one portion of the rennet. Stand away with 4 and 5.

7. Bring 1-4 cup of milk to 98° F., add one portion of the rennet, and place with the others. Examine it after 15 minutes, noting the consistency.

8. Heat 1-2 cup thick sour milk to 98° F. Strain without pressure through cheese-cloth, and note appearance of curd.

9. Heat 1-2 cup thick sour milk to 120° F. Treat and examine like 8.

10. Bring 1-2 cup clabber to boiling point. Examine like 8.

Questions: From 4, 5, 6 and 7, to what degree should milk be heated for best results in making junket custard?

What do these experiments show regarding the drinking of ice-cold milk, or the eating of large amounts of ice cream at meals?

From 8, 9 and 10, draw conclusions as to the best temperature for milk when making cottage cheese. Which of the three gives the best appearance? Which is the most wasteful? Which makes an indigestible cheese?

EGGS.

EFFECT OF HEAT ON ALBUMEN.

1. Put into a test tube a small amount of white of egg, insert a chemical thermometer, and hold the tube in water, heating gradually. Note the appearance of the white at 134°, 160° and 212° F. Stir occasionally while heating to see the solidity.

DIGESTIBILITY.

2. Have three test tubes at hand. In one place a teaspoonful of very soft-cooked white of egg; in another, the same amount of finely chopped white of hard-boiled egg; and in the third, place half-inch piece of hard-boiled white.

Put into each tube some pepsin and hydrochloric acid, making them about half full, and set the test tubes in water at 98° F. Keep them at this temperature for one and a half hours, then examine, noting which has been the more readily dissolved. Several hours later, look at them again.

(Note—By using 1.1 parts of pepsin, and 7.5 parts of hydrochloric acid, there may be made a mixture similar to the digestive juice in the stomach.)

Questions: From 1, what rules may be made regarding the time and method of mixing eggs with the liquid in making dressing for cole slaw; also, in thickening sauces and puddings?

From 2, how might one decide upon the best ways of cooking eggs for an invalid? What method might be risked for persons doing muscular work?

MEATS.

STRUCTURE AND COMPOSITION.

1. Choose a piece of lean beef, cut from the flank, round, or neck. Use a dull knife, and scrape it lengthwise of the fibre, noting the structure. Examine a muscle fibre under the microscope. Make a drawing.

2. Cook a piece of cartilage slowly in water. Finally allow the water to boil down to a small amount. Take out the cartilage, and set the liquid away to chill. (It should become stiff, showing the presence of gelatine.)

3. Burn a rather large bone in a hot fire until it becomes a white, porous framework. (Lime, to a great extent.)

4. Cut some meat, mostly lean, into quite small pieces, put into a test tube, cover with cold water, and let soak for an hour or more. Then note the color of the water.

5. Bring the liquid from 4 to a boil, strain, add a speck of salt, and taste. Does the flavor show any extractives from the meat?

BAKING POWDERS.

1. Taste cream of tartar, and note color.

2. Taste bicarbonate of soda, and note color. Compare flavor and color with 1.

3. Mix 1-4 teaspoonful cream of tartar and 1-2 teaspoonful bicarbonate of soda. Taste.

4. To 3 add a little less than 1-4 teaspoonful of flour. Mix all well together, and taste.

5. Taste a cream of tartar baking powder, and compare with 4 as regards flavor.

6. Put 2 tablespoonsful of cold water in a test tube, and 1-4 teaspoonful bicarbonate of soda, stirring until dissolved. Notice bubbles. Of what are they formed?

7. Same experiment as 6, using boiling water. In which liquid are the bubbles given off the more rapidly?

8. Try cream of tartar by the same methods as 6 and 7. Note whether it dissolves, and whether any gas is formed.

9. To 7 add half the amount of 8. Note gas formed, also odor and flavor. Compare with 3.

10. Stir 1-2 teaspoonful baking powder with 2 tablespoonsful cold water. Compare with 9. Note sediment. What is it? (See 4.)

11. Let mixtures 9 and 10 stand until bubbles form very slowly, then add boiling water, and note whether gas is given off. Explain.

12. Compare taste of sour milk, lemon juice, vinegar and molasses—Porto Rico or sorghum—with 1. (The reaction of molasses may be tested with litmus paper.)

13. Put 1 tablespoonful of each substance in 12 into separate test tubes, add to each 1-8 teaspoonful bicarbonate of soda. Stir well, and compare with 9.

14. Allow 13 to stand for about 10 minutes, add boiling water, and compare with 11.

15. To 1-8 cup of flour add about 1 tablespoonful cold water, mixing to a dough. Put it in a glass measuring cup or tumbler, so that the amount may be easily seen. Let it stand a while. Note whether it increases in size.

16. To 1-8 cup flour add 1-4 teaspoonful baking powder, mix well, and add 1 tablespoonful cold water, mixing and standing aside as in 15. Note the difference in bulk as compared to 15.

17. Set the cup containing 16 in a pan of warm water, and heat gradually. Does the mixture increase in bulk?

18. Using two forks, lightly pull apart the warm dough from 17. Note appearance of inside compared with 15.

Questions: What is the active principle in baking powder? Why do manufacturers put some starch into baking powder? Does a soda and cream of tartar mixture give off all its gas when mixed with a cold liquid.

In case no baking powder is at hand, what may be used in its place?

With sour milk or molasses, which is the better to use, baking powder or bicarbonate of soda? Explain.

Is it well to mix a batter or dough, and then let it stand for some time before baking?

Is a cold or a hot liquid the better to use in mixing a batter?

What is the proper time for adding baking powder to a batter?

YEAST.

1. Have at hand four test tubes. Label them a, b, c, and d.

Mix 1 yeast cake with 4T. cold water. Then put an equal portion of the liquid into each test tube. Put 1-2 T. molasses into each of the tubes a, b and c.

Fill a with luke-warm water, about 75° to 80° F. Stand it in a beaker or tumbler holding luke-warm water, and keep it at this temperature.

Fill b with boiling water, and stand aside.

Fill c with ice water, and set the tube in a beaker containing cracked ice.

Fill d with cold water.

After about 30 minutes examine all of the test tubes. See whether there is foam on any of them. Foam denotes that the yeast is growing.

2. Later, place tubes b and c in luke-warm water, and let stand a while, noting whether any change occurs.

3. Under the microscope, examine a drop of yeast from the test tube a. Note the shape of cells, whether any buds are forming, and make drawings.

4. Close a with a stopper in which a bent glass tube is inserted. Have some lime water in a beaker. Set this beside a, and place the free end of the glass tube in the lime water. Note whether the lime water grows milky. This is a test for carbon dioxide.

Questions: What would you think the best temperature for bread sponge or dough?

What would happen to bread sponge started with boiling water?

If bread sponge or dough be kept in a very cool room, what effect will this have on its lightness?

FLOUR.

1. Mix 1-4 c. flour with enough cold water to form a stiff dough. Put it in a piece of cheese-cloth, then wash and knead the dough under cold water, until nothing more can be washed out. Note the tough substance left in the cheese-cloth. This is gluten. Try stretching it.

2. Take 1-4 c. cornmeal. Treat like 1. Compare result with 1.

3. Use 1-4 c. rye flour, and treat as in 1, comparing result with 1.

4. Bake the gluten obtained in 1. Note its increase in bulk. Open and note the appearance of the interior. Which would make the best loaf bread, flour with little, or with considerable gluten?